Vision-based Navigation of Autonomous Vehicle In Roadway Environments With Unexpected Hazards

Technology Transfer Activities

by

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Table of Contents

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1 Outputs

The project output includes a journal paper, and data collected from autonomous vehicle simulator.

1.1 Output #1

We have also published the content of this report as a journal paper in the Transportation Research Record journal.

> *Islam, M., Chowdhury, M., Li, H. and Hu, H., 2018. Vision-Based Navigation of Autonomous Vehicles in Roadway Environments with Unexpected Hazards. Transportation Research Record, p.0361198119855606.*

1.1 Output #2

Data about autonomous vehicle (AV) navigation and perception is generated from a robotics simulation software. We contribute this new dataset that can be used by the autonomous vehicle community to improve the driving model in unexpected hazardous roadway environment.

2 Outcomes

We assessed the Deep Neural Network (DNN)-based autonomous vehicle driving system that uses object detection and semantic segmentation to mitigate the adverse effect of this type of hazardous environment. The assessment is shown in the final project report.

Models were developed related to AV perception and navigation for decision making. More models of end-to-end AV driving can be developed using the data generated in this project.

3 Impacts

We find that our developed DNN-based autonomous vehicle driving system including hazardous object detection and semantic segmentation improves the navigational ability of an autonomous vehicle to avoid a potential hazard by 21% compared to the traditional DNN-based autonomous vehicle driving system. Our analysis results can guide AV industry to develop safe and efficient DNN models for AV navigations that can operate in challenging environments.