IMPROVED VISION-BASED LANE LINES DETECTION IN ADVERSE WEATHER CONDITIONS UTILIZING V2I COMMUNICATION

The Oakland University and School of Engineering and Computer Science communities are invited to attend Modar Horani's defense of his Ph.D. dissertation. Seating is limited. RSVP with Katie Loodeen at loodeen@oakland.edu.

Improved Vision-based Lane Lines Detection in Adverse Weather Conditions Utilizing V2I Communication

Committee: Osamah Rawashdeh, Ph.D. (Chair), László Lipták, Ph.D., Brian Dean, Ph.D., Mohammad Siadat, Ph.D.

Time: **2:00 – 4:00 p.m.**
Date: **Tuesday, July 9, 2019**
Location: **347 EC**

Lane line detection is a very critical element for both Advanced Driver Assistance Systems (ADAS) and Autonomous Driving features. Although, there has been significant amount of research dedicated to the detection and localization of lane lines in the past decade, there is still a gap in the robustness of the implemented systems. A major challenge to the existing lane line detection algorithms stems from coping with bad weather conditions (e.g. rain, snow, fog, haze, etc.). Snow offers an especially challenging environment, where lane marks and road boundaries are completely covered by snow.
In this research, the focus is on improving robustness of lane lines detection in adverse weather conditions, especially snow. A framework is proposed that relies on utilizing Vehicle-to-Infrastructure (V2I) communication to access reference images stored in the cloud. These reference images were captured at approximately the same geographical location when visibility was clear and weather conditions were good. The reference images are used to detect and localize lane lines. The proposed framework uses image registration techniques to align both the sensed and reference images. A real-world experiment is designed to evaluate the error in localizing the lane lines using the proposed framework in comparison to ground truth data. The novelty of this work is a result of proposing a vision-based ADAS method that uses prior knowledge about the environment instead of being solely reactive to vehicle sensor inputs.