Master Thesis 2018/2019

"Driver monitoring camera-based collision avoidance algorithms"

Background

Recent advances in machine learning, sensor technology and computational power have led to availability of affordable driver monitoring camera (DMC) systems (DMS). The ability to accurately determine intended actions and awareness of road threats based on driver’s eye, head, and gaze data will be crucial for Active Safety systems to provide better situational awareness and ultimately a safer journey.

Project description

This project focuses on the development of a threat-assessment and decision-making algorithm for collision avoidance, leveraging DMC-based metrics representing the drivers’ awareness. This awareness levels can be used to, for example, brake in advance with respect to unseen obstacles, or to keep the vehicle in lane in case of unintended lateral departures.

Based on available gaze-based threat awareness metrics, the purpose of the thesis is to investigate the expected effects of adapting today’s collision avoidance algorithms to such threat awareness metrics and to understand:

• the correlation between developed target awareness metrics and the threat metrics used in today’s collision avoidance algorithms. A strong correlation, especially for high threat levels, should indicate high applicability of the metrics, and vice versa.
• Which of the developed concepts for awareness estimation show(s) most promising effect on today’s collision avoidance threat assessment when it comes to balancing effectiveness with the risk of unjustified system action. The study will be carried out based on the FOT data for collision avoidance by steering and braking, respectively, with focus on the following scenarios: frontal collisions (i.e., eLKA Oncoming feature), rear-end collisions (i.e., Forward Collision Warning feature), and lane departures (i.e., LKA features).

Qualifications

• A highly motivated student from a master program on Electrical Engineering, Mechatronics, Computer Science or any pertinent domain, with an interest in control algorithms and data analysis.
• The ideal candidate should have interest in both the theoretical and experimentation aspects of the problem.
• Solid programming skills are required. Experience with MATLAB is an asset.
• Effective communication skills in English both in oral and written.

The thesis students will gain competences on

• Modeling driver’s behavior and its influence on driving
• Developing threat assessment algorithms with market leading technology
• Automotive engineering

Further information and contacts

Please send in individual applications with CV, motivational letter and grade transcripts (undergraduate and graduate education) at the following link:


If you wish to partner with someone, simply note that in your application. For questions regarding the project, please contact:

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