State-of-the-Art and Future Trends in Testing of Active Safety Systems

Empirical Study Results with the Swedish Industry

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Summary:
Due to the complexity and the integrated character of active safety systems, testing poses a big challenge. An infrastructure is required that consists of test targets and driving robots to systematically evaluate a system under repeatable conditions. This infrastructure needs to reliably coordinate the involved test targets in terms of synchronicity as well as to collect different kinds of data for test evaluation like position and heading over time. Future test scenarios are envisioned to include even more robotic actors than in use today that need to be coordinated synchronously to collect relevant data for analyzing the algorithms for an active safety system to handle more complex traffic situations.

At the AstaZero Researchers' Day in fall 2015 we have presented the design for our on-going study on active safety testing conducted as part of the A-TEAM (Avancerat TEstsystem Avancerade Metoder) project. Now we would like to report on the results of this study with representatives from the Swedish industry. The study focuses on the state-of-the-art and future trends in testing of active safety systems and investigates the following research questions: *RQ1: What is the state-of-the-art in testing of active safety systems?* And *RQ 2: What are future trends motivated by automated driving that will have an impact on testing of active safety systems?*
We combine four focus groups including 11 practitioners with a Swedish background (i.e., with practitioners from two vehicle manufacturers, representatives from a proving ground for active safety testing, as well as a research institute, and a tier-1 supplier) with an analysis of proceedings from the most recent edition of a conference specifically devoted to the research area of active safety systems, the FASTzero 2015 conference.

We used a word frequency analysis approach to summarize the concepts covered in the focus groups. We apply the word frequency analysis independently 1) for the state-of-the-art, and 2) for the future trends discussed in the focus groups. We will present the results for the most frequent used terms for each part in our presentation. Additionally, we identify 15 papers that use the keywords "test" and "active safety" from the collection of all FASTzero papers. Similarly to the content of the focus groups, we apply word frequency analysis on the 15 papers. Furthermore, we arrange the papers based on the similarity to state-of-the-art and future trends discussed with the practitioners in focus groups. By determining the similarity of the research papers to the content (of the focus groups) from the practitioners, we are able to provide an overview and help practitioners to identify papers presenting relevant concepts to the state-of-the-art, but also papers presenting relevant concepts to the future trends of active safety testing.

Keywords: active safety, testing, test scenarios, testing processes