Processes and Infrastructure for Testing of Active Safety Systems

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A-TEAM project partners:

[Logos of Autoliv, Volvo, and ASTA Zero]
Motivation

- Active safety systems
- Testing of active safety systems
- Infrastructure of test targets and equipment needed
Overview

**Pre-study:** Challenges of Testing Active Safety Systems

**Step 1:** Investigate the current state-of-the-art in testing processes & future trends

**Step 2:** Stakeholders & use cases (ecosystem around the proving ground)

**Step 3:** Properties for infrastructure to support testing processes
Challenges of Testing Active Safety Systems

• Brainstorming Workshop
  – 2 academic and
  – 10 industrial partners

• Questions discussed:
  – What is missing in terms of
    • concepts,
    • methods,
    • tools, and
    • equipment
  – Where do we see the most urgent and important challenges to better carry out tests for active safety systems?

• PostIts used to involve everyone, later grouped
Challenges of Testing Active Safety Systems

- Test Conditions
  - Test Scenarios → A-TEAM II
  - Virtual Test Environment
  - V2X & Communication
  - Autonomous Driving/GAME → A-TEAM II

- Data Analysis and Reuse
  - Test Targets & Equipment → A-TEAM II
  - Integrate Scenarios between Simulation & Test Track
  - Test System Infrastructure

- Safety
  - Driver Models
Overview

Pre-study: Challenges of Testing Active Safety Systems

Step 1: Investigate the current state-of-the-art in testing processes & future trends

Step 2: Stakeholders & use cases (ecosystem around the proving ground)

Step 3: Properties for infrastructure to support testing processes
Research Methodology: State-of-the-Art

- **On-site workshops with industrial partners**

- **Systematic mapping study of the state-of-the-art in science and technology**

- **On-site workshops/survey with industry to reflect on the results from research and industry**

- **Extend and compare results to related domains**
Research Methodology

Current state-of-practice

Goals:
– Scoping
– Understand current test scenario design
– Data collection
– Understand test workflows
– Centralized control, logging, data
– Restrictions concerning dummies - size, shape, color, material

Future trends

Goals:
– Consider future trends for active-safety systems
– Understand relevant characteristics of future active-safety systems
– Testing of systems-of-systems
– How to provide required metrics for future systems
Workshops

• Content
  1. State-of-the-practice in testing of active safety systems
  2. Passive vs. active safety
  3. Designated questions derived from pre-study
  4. Future trends that affect testing of active safety systems

• Data post processing
  – Separate data transcript in small pieces
  – Apply coding [Shu07]
  – For 2 workshops:
    • 323 entries (151 + 172)
    • 1063 codes for first workshop

First results

- Manual testing of active safety systems is currently supported

- Automation of test processes needed, for example to
  - further the advances, and
  - deal with the increased complexity

- Future trends
  - increased automation and coordination between actors
  - connectivity between vehicles
  - user experience, and
  - user trust (based on literature)
Summary/ Future Work

• On-site workshops with industrial partners

• Systematic mapping study of the state-of-the-art in science and technology

• On-site workshops/survey with industry to reflect on the results from research and industry

• Extend and compare results to related domains
THANK YOU!

Participate in our study?
Email: alessia.knauss@chalmers.se

Project partners:
Autoliv, AB Volvo, VCC, SP, AstaZero