European Training Network on

Safer Autonomous Systems (SAS)

Deliverable 4.13 – SAS Special Session/Workshop I

@DATE conference, Initiative on Autonomous Design (ASD)

April 21, 2020

Authors: Ahmad Adee and Peter Munk (Bosch)

Deliverable Number	**D4.13**
Deliverable Name	**SAS Special Session/Workshop I**
Estimated Due Date of Deliverable	November 30, 2019
Revised Due Date Deliverable	March 31, 2020
Actual Submission Date	August 17, 2020
Deliverable Lead Partner	Bosch
Dissemination Level	Public
Work Package	WP4 Training
No of Pages (Annex not included)	6
Keywords	Special Session, Workshop, DATE ASD Conference

Prolegomena

SAS Deliverable 4.13 was initially, as stated in the Grant Agreement Annex I Part A, foreseen to be the report of a Special Session/Workshop organized at SAFECOMP 2019. However, this Deliverable 4.13 was already deviated and shifted into a Special Session organized at DATE ASD 2020 which was initially scheduled from March 9-13, 2020 in Grenoble, France (see Deliverable 4.13 Deviation document attached which was sent via a Formal Notification to the EC REA on February 20, 2020).

Due to the current COVID-19 outbreak, the physical DATE ASD 2020 conference was cancelled and replaced by a virtual event spread over March and April 2020. By consequence, the SAS Special Session at DATE ASD 2020 took place virtually on April 21, 2020 and was organized by Peter Munk and Ahmad Adee (ESR8), both affiliated at Bosch.

Conference Selection

Considering the initiative taken by the DATE conference on autonomous system design, this conference was selected by the SAS consortium to submit a Special Session proposal since the call for contributions includes "*Dependable systems design for autonomous systems including, but not limited to, functional safety concepts, fail-operational systems design, functional safety for applications with machine learning, safe and secure changes and updates, autonomous systems security.*"[1]

Application for the Special Session

Title: "Uncertainty Handling in Safe Autonomous Systems" (UHSAS)

Abstract: Are you ready to take a seat on an autonomously controlled airplane? If you hesitate to say "yes", then you are tacitly acknowledging the need for more trust in autonomous systems. Autonomous systems, including airplanes, vessels, trains and vehicles have to be safe enough so that people trust them. Furthermore, their dependability and safety need to be argued in a way that even the first fatal crash involving two fully autonomous systems,

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[1] http://asd.userweb.mwn.de/cfp.html

which is inevitable due to the residual risks in every system, will not have the same result as the Hindenburg disaster had for airships.

At the same time, autonomous systems represent highly complex cyber physical systems that often employ artificial intelligence and machine learning algorithms, e.g. for perception, which are of statistic nature and pose an additional challenge in the argumentation of the overall system's dependability. Furthermore, well-established functional safety measures are insufficient due to their limited focus on malfunctions of the E/E systems. New safety engineering methods to address system safety and argue the safety of the intended functionality (SOTIF) are necessary to consider limited performance or unanticipated environmental circumstances.

The quantification and analysis of aleatoric, epistemic and ontological uncertainty seems a promising way to address the mentioned issues. While there has been research on uncertainty in engineering, the applicability to the safe operation of complex autonomous systems and the adoption in industries is an open problem. Novel approaches for system implementation, analysis and argumentation considering the system-internal as well as environmental uncertainty of autonomous cyber physical systems are of paramount importance.

Session Submissions

After the Special Session proposal was accepted, three talks about uncertainty handling in safe autonomous systems were invited, starting from the domain space via a model-based system analysis technique down to uncertainty handling of a machine learning algorithm as a prominent and relevant system element.

- Making the Relationship between Uncertainty Estimation and Safety Less Uncertain *(Vincent Aravantinos, Autonomous Intelligent Driving GmbH and Peter Schlicht, Volkswagen Group Research)*
- System Theoretic View on Uncertainties *(Roman Gansch and Ahmad Adee Robert Bosch GmbH)*
- Detection of False Negative and False Positive Samples in Semantic Segmentation *(Hanno Gottschalk, Matthias Rottmann, Kira Maag and Robin Chan, University of Wuppertal & ICMD, Fabian Hüger and Peter Schlicht, Volkswagen Group Research)*

Virtual Conference

Due to effects of the COVID-19 pandemic, the DATE conference organizer decided to conduct a virtual conference instead of the physical event that was planned in Grenoble from March 9-13, 2020. A special webpage was created to access the whole conference material. Initially (i.e. for the physical event), the session was scheduled on March 13, 2020.
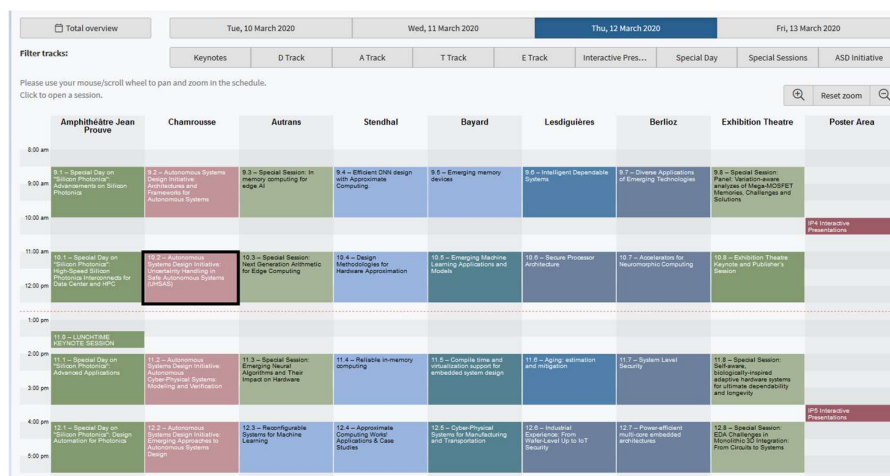

Figure 1 Session Schedule (source)

In order to replace the physical talks and presentations, the speakers recorded their presentation, which were then made available through the virtual conference webpage.
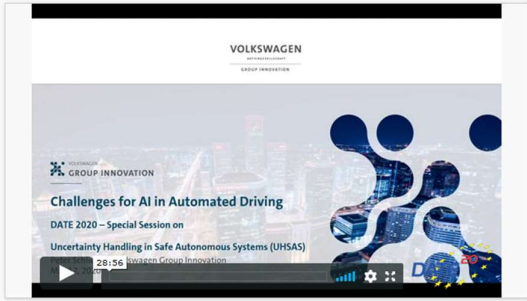
Figure 2 Making the Relationship between Uncertainty Estimation and Safety Less Uncertain (Peter Schlicht) (source)

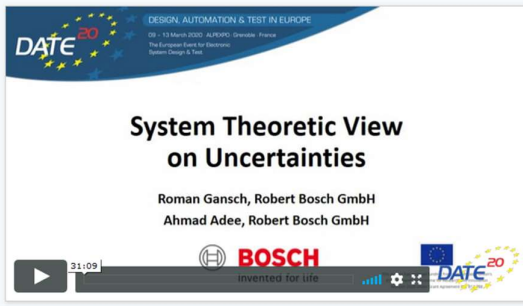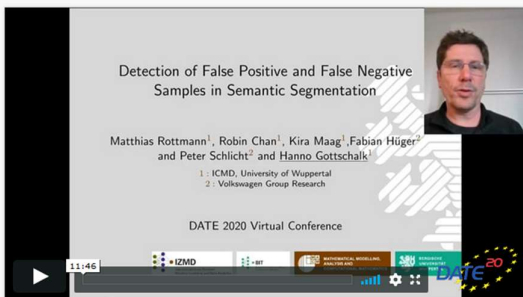*Figure 3 System Theoretic View on Uncertainties (Roman Gansch) (source)*

Figure 4 Detection of False Negative and False Positive Samples in Semantic Segmentation (Hanno Gottschalk) (source)

Session Outcome

The submitted publications are made available at IEEE proceedings. Unfortunately, due to the virtual format of the conference, extensive discussion on and between the presented submissions did not take place.

Annex 1: Deliverable 4.13 SAS Special Session/Workshop I Deviation document

Annex 1

Deliverable 4.13 SAS Special Session/Workshop I Deviation document

Deviation from the SAS Grant Agreement

Description of the Action Annex 1

DELIVERABLE 4.13

DATE ASD 2020

Item:	Deliverable 4.13
Title:	*DATE ASD 2020*
Lead Beneficiary:	BOSCH
Which ERS(s) involved:	Ahmad Adee
Initial Foreseen Due Date:	Nov 30, 2019
Postponed Due date:	March 31, 2020
Other Title (Workshop /Special Session):	Special Session "Uncertainty Handling in Safe Autonomous Systems (UHSAS)" at DATE ASD 2020

What is the **reasoning/justification** for postponing the due date for this SAS Deliverable 4.13? Please explain briefly.
At the time of writing the project proposal a workshop at CPS Week 2020 was planned, while it was announced that the CPS Week 2020 will take place in Sydney only after the start of the project. Given the current financial situation in general and specifically in the participating automotive companies, we searched for alternative conferences we reasonable travel costs. The Design, Automation and Test in Europe (DATE) Conference and the DATE Initiative on Autonomous Systems Design (ASD) have a perfectly fitting scope and we expect valuable feedback from experts in the field.

What is the **mitigation plan** (Action Plan) regarding the new due date for this SAS Deliverable 4.13? Also please explain briefly.
The proposed special session at DATE-ASD that was accepted.

Does this postponed due date for this <mark>Deliverable 4.13</mark>has **any implications or consequences regarding the SAS Description of the Action as stated in the Grant Agreement Annex 1** and furthermore regarding the Project Implementation of the SAS Project? <u>If not, please mention this specific. If so, please explain in detail which implications or consequences</u>.

No