Introduction to Collective Perception: how V2X is setting the scene for autonomous driving

Presented by:

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www.commsignia.com

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Agenda

- Introduction
- State of the Art
- The Plan
- Collective Perception
- Trust
- Future V2X enablers

"Building the foundations of a cooperative system is a collaborative effort and our mission is to take the lead and get involved."





SECREDAS has received funding from the Electronic Component Systems for European Leadership Joint Undertaking under grant agreement nr.783119. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme and Austria, Belgium, Czech Republic, Germany, Finland, Hungary, Italy, the Netherlands, Poland, Romania, Sweden and Tunisia.

About Commsignia

Commsignia is a **global automotive TIER2 V2X solution** provider with HQ in Santa Clara, CA, USA and development office in Budapest, Hungary. Commsignia is also a **supplier of V2X roadside units** worldwide. We have 8+ years experience in delivering market leading products for vehicular communication stack, security stack, fusion and safety application solutions.



What is V2X?



- Dedicated
 - "Short" range
 - Low latency
 - Cooperative
- Safety relevant

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V2X generations

- Agreed set of services
- Minimum requirement
- Set of standards and profile(s)

Cross-industry agreement





The Plan

The "common language": secure protocol messages defined by standards to enable sensor data sharing among multiple brands of vehicles

- Basic state and dynamic information (e.g. CAM)
- Event or area-based notifications (e.g. DENM)
- Infrastructure services, including intersection state

The Application: Defining the end user experience

	Road Safety		Efficiency				
		I2V			1/2//		
	V2V	Alerts	IVS	Intersect ion	(+V2I)		
ETSI	CAM	DENM	DENM, IVI	MAP, SPAT	Probe Data		
WAVE	BSM	RSA	TIM, RSA	(SRM, SSM)	Manage ment		



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Euro NCAP

ROADMAP 2020								
AEB VRU cyclist			•••••					
Far-side protection	<u> </u>		<u> </u>					
Mobile progressive deformable barrier								
ROADMAP 2025 – SAFETY RATIN	G							
Driver monitoring								
AEB VRU pedestrian - Back-over								
AEB - Junction & Crossing								
AEB - Head-on				_				
Automatic Emergency Steering								
V2X								
Whiplash/Rear-end Crash Protection								
Revised subsystem for pedestrian & cyclist					_			
Rescue, extrication and safety			_					
Child presence detection					• • • • •			
ROADMAP 2025 – AD								
Grading of AD functions								
			• • • • • • • • • • •	• • • • • • • • • • • • • • • • • • • •	• • • • • • • • • • •	• • • • • • • • • • • • •	• • • • • • • • • • •	• • • •
	Communication onl based on first ideas	Y	Propo	osal to release updat phase with overall ra	es out ting			
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Source: https://cdn.euroncap.com/media/30700/euroncap-roadmap-2025-v4.pdf

13





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- Deployment
- Penetration
- More services
- Higher quality (of service)
 - Security
 - Reliability
 - (functional) safety

Volkswagen Safety Technology Rewarded by Euro NCAP

18th March 2020

Today, Euro NCAP rewards <u>Volkswagen's 'Local Hazard Warning' system</u> with an 'Advanced' award.

Volkswagen's car-to-x communication_system becomes the first technology to be rewarded by Euro NCAP in nearly_six years. The technology, fitted as_standard to the **Golf 8** and to future ID models, allows cars to communicate with each other and with properly equipped road infrastructure and emergency vehicles to give the driver advanced warning of local_safety hazards. Using ITS-G5 technology, cars equipped with the_system can transmit a_signal to others if they have broken down or have_stopped_suddenly and



present a safety risk. Other manufacturers are also considering equipping their vehicles with ITS-G5 technology and, in time, it may be possible for drivers to receive advance warning of motorcycles and tractors.

Source: https://www.euroncap.com/en/press-media/press-releases/volkswagen-safety-technology-rewarded-by-euro-ncap/

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Collective perception - not just for vehicles



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Commsignia dual-mode roadside unit











The PRoPART project has received funding from the European GNSS Agency under the European Union's Horizon 2020 innovation programme under grant agreement No 776307.

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PRoPART Project introduction Movie

https://youtu.be/I-_zWrsLr-4 Watch the video on Youtube or visit propart-project.eu



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Lets talk about:

TRUST



Future enablers

The plan

- Deployment
- Penetration
- More services
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www.safertec-project.eu/



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SAFERtec has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 732319

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Misbehavior detection

Proximity Plausibility	 Algorithms check consistency between RSSI and CAM/BSM based location information (optionally fused with sensor data).
Motion Validation	 Path prediction based on location information, consistency checking (no jumps, unrealistic speed, etc.)
Content and Message Verification	 Check that message sending and contents are in accordance with the standard (e.g., CAM frequency v. speed).
etc.	



Industrial cooperation



https://secredas.eu/





ECSEL

Next services on the roadmap:

Platooning and Maneuver Coordination Service





Platooning and Maneuver Coordination Service

• Introduction of encryption





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Server side applications running as virtual machines. Looking into the future: time critical Multi-access Edge Computing Coud (data center, application hosting) Internet PDN GW MEC Opt. 4 Transport Network / Core PLMN Aggregation Router MEC E Opt. 1 Site MEC BTS Site Router Opt. 3 Router BTS Single-BTS Multi-BTS MEC site site BTS Opt. 2

- Distributed computing approach ٠
- Processing and analyzing of data ٠ closest to the point of its collection
- Dynamic and scalable ٠

(MEC) services



Future enablers

Other alternative futures for V2X: New markets

- Aerial freight transport
- Railway



Source: ETSI.org





https://www.youtube.com/watch?v=jOKmDpUrPZ8

Watch the video on Youtube or visit http://safer-lc.eu/



Final thoughts, invitation to collaborate

- Communication stack expertise for your project
- Take responsibility from challenge to technical specification
- Listen and support system design
- Being fast and ahead with solutions to trial
- Provide resources, offload partners



Q&A

Contact us at

https://www.youtube.com/user/commsignialtd

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Backup Slides







Precise and Robust Positioning for Automated Road Transports The objection



RoPART Project Introduction Movi

https://youtu.be/l- zWrsLr-4 Watch the video on Youtube!



Website: http://propart-project.eu Started in December, 2017 Duration: 24 months Budget: 3 mEUR The objective of the SCANIA driven project PRoPART is the development and demonstration of a high availability positioning solution for connected automated driving applications. The project's RTK (Real Time Kinematic) software solution exploit the distinguished features of Galileo signals as well as combining it with other positioning and sensor technologies.

ROLE

Advanced Commsignia Roadside units are used for various Day1 and Day 2 services: RTK based GNSS correction data, Collective Perception Service, UWB ranging. Radars provide roadside object and freespace detection capabilities and the low latency environmental perception is sent to an automated Scania truck via V2X where highly accurate and fused V2X data is used to support a lane change maneuver. Freespace distribution was introduced and standardized at ETSI by Commsignia during the project.



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SAFER-LC



OUTLINE

The main objective of SAFER-LC is to improve traffic safety and minimize risks of transportation at and around rail-road level crossings (LCs) by developing a fully integrated cross-modal set of innovative solutions and tools for the proactive management and design of level-crossing infrastructure. Partners include SNCF and DLR.

ROLE



https://www.youtube.com/watch?v=jOKmDpUrPZ8

Watch the video on Youtube!

Website: http://safer-lc.eu/ Started in May, 2017 Duration: 36 months Budget: 4.8 mEUR Commsignia deploys V2X communication enhanced for V2I and V2R – Vehicle-to-Rail use, extending the scope of V2X to support Railway infrastructure.









OUTLINE

SAFERtec proposes to define a flexible and efficient assurance framework for security and trustworthiness of 'Connected Vehicles' & Vehicle-to-Infrastructure (V2I) communications seeking to improve the cyber-physical security ecosystem of Connected Vehicles in Europe. Main partners include CRF, Airbus, Swarco and Autotalks.

ROLE

Commsignia is providing solutions for V2X communication and related application within the projects **secured connected vehicle**.





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Website: https://www.safertec-project.eu/ Started in January, 2017 Duration: 36 months Budget: 3.8 mEUR SECREDA

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OUTLINE

The high-level goal of SECREDAS is to propose a significant and innovative solution for Safety, Security and Privacy dedicated for automated systems. This solution will include a reference architecture, powerful components and common approaches regarding integration and verification for the sectors of automotive, health and rail for which the automation is major challenge regarding the safety of operation, the security of persons and the privacy of citizens.

ROLE

Commsignia joins key providers of the automotive supply chain, including NXP, Ficosa and Canon to fully integrate all V2X components into the novel connected vehicle ecosystem. Activities include the definition of a secured Collective Perception Service and low latency Misbehavior Detection.



Website: https://secredas.eu/ Started in May, 2018 Duration: 36 months Budget: 51 mEUR