

iVT **AUTONOMOUS** Industrial Vehicle Technology C O N F E R E N C E

FEBRUARY 13-14, 2019
KÖLN MESSE, COLOGNE, GERMANY

THE WORLD'S ONLY INTERNATIONAL CONFERENCE ON AUTONOMOUS, UNMANNED
& HIGHLY CONNECTED AGRICULTURAL, INDUSTRIAL & OFF-HIGHWAY VEHICLES



PRELIMINARY PROGRAM

Taking place at

iVT EXPO
INDUSTRIAL VEHICLE TECHNOLOGY

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AUTONOMOUS INDUSTRIAL VEHICLE TECHNOLOGY CONFERENCE

iVTAUTONOMOUS
Industrial Vehicle Technology

The Pathway to Highly Automated & Unmanned Commercial & Off-Highway Vehicles

The Autonomous Industrial Vehicle Technology Conference is exclusively dedicated to the design and development of highly automated and unmanned construction, mining, agricultural, industrial and off-highway vehicles.

Hear from leading industry experts, network with over 350 delegates across four conferences. PLUS: Discover the next generation of industrial vehicle components, materials, concepts and manufacturing technologies at iVT EXPO – Entry included with your delegate pass!

The conference will bring together R&D engineers, robotics experts, OEMs, autonomous vehicle systems hardware and software engineers, test and development experts, and heads of design and engineering from around the world to discuss, debate and analyze the growing possibilities and future developments for autonomous vehicle technology, unmanned systems and robotics for commercial and off-highway applications.



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Parallel conferences:

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iVT Industrial Vehicle
POWERTRAIN TECHNOLOGY

DAY 1 WEDNESDAY FEBRUARY 13

ASI's state-of-the-art technology for driverless industrial vehicles

Mel Torrie, founder and CEO, Autonomous Solutions Inc, USA

Autonomous Solutions Inc (ASI) has robotic vehicles operating around the world in markets like mining, agriculture, automotive and material handling. Technology developments like ASI's multi-vehicle command and control software give a single operator control over a fleet of vehicles. However, ASI's driverless technology wouldn't be possible without continued work in localization for increased accuracy indoors/outdoors and environmental awareness for obstacle detection/avoidance. ASI engineers have succeeded along the way to make the technology smarter and more aware of surroundings. Learn how ASI's cutting edge driverless ground vehicle technology is changing the commercial industry.



Challenges and opportunities for automation in agriculture

Brett McClelland, autonomous vehicles product owner, CNH Industrial, USA

The presentation will offer an overview of the headline challenges facing the agricultural industry related to autonomy compared with the vast opportunity to solve new problems with the technology. This will include updates on insights learned from the CNH Industrial autonomous vehicle pilot programs, where we are pioneering new technologies while learning alongside customers in the field.



A guide for building off-highway autonomous machines

Dr Elza Marisa Paiva de Figueiredo, autonomous system manager for Europe, Danfoss Power Solutions, Denmark

There are several technical considerations to keep in mind when designing an off-highway autonomous machine. This presentation will cover some practical applications of the various technologies encountered when building an autonomous machine and focus on the environments where they are best suited. A few helpful tools will also be highlighted to help accelerate your development efforts as you embark on your journey to build safer, more intelligent machines.



Electric Site: autonomy for a complete site solution

Uwe Müller, chief project manager - advanced engineering, Volvo Construction Equipment, Sweden

Uwe Müller was the chief project manager for the groundbreaking Electric Site study carried out in a quarry with a fleet of autonomous and electric machines, resulting in a 98% reduction in carbon emissions, 70% reduction in energy costs and 40% reduction in operator costs. The project involved developing new machines and site management systems, forming a complete site solution with connected machines programmed to collaborate to carry out a specific set of actions on a pre-defined route. A specialist in autonomous technologies, Uwe will also share other pioneering development at Volvo CE to help customers improve efficiency, safety and costs.



Resilient software architectures for autonomous systems

Dominique Seydel, research engineer, Fraunhofer ESK, Germany

AI-based solutions are a suitable approach to cope with the complexity of autonomous driving tasks. However, decisions taken by AI are not reliable, as their decision-making process cannot be validated. AI-based solutions therefore require fundamentally different approaches to guarantee the dependability of the system in every driving situation and its failsafe behavior. Therefore, resilient software architecture solutions give the AI adequate freedom to play out its strengths and intervene when the data determined by AI could lead to unsafe decisions. This presentation will give an insight into different approaches for resilient software architectures used for dependable autonomous systems.



Limited-environment autonomous driving

Farhad Bolourchi, manager - systems and controls, Nexteer Automotive, USA

In this presentation, we will discuss an indoor autonomous robot project we have been working on, including the system architecture, perception, planning and control, with an emphasis on the importance of improving performance through a position control actuator. Nexteer Automotive is a leading Tier 1 supplier of automotive steering systems. The firm has provided dual redundant electric power steering (EPS) systems with command tracking software to many leading autonomous vehicle startups and major OEMs. We will discuss the importance of dual redundant EPS for functional safety.



Hardware and software platforms for autonomous operations – challenges and opportunities

Roberto Ferrari, director services and operations off-highway, TTControl GmbH, Austria

The rising demand from mobile machinery manufacturers for autonomous operations is linked to new challenges, but also to new opportunities for hardware and software suppliers. In addition to the need for higher CPU performance and storage capacity to handle the data flow, higher safety, new processes and tools are required to fulfill the increasing demand. The future collaboration between the operator and the machine itself will be redefined. Still, we need to be aware that this approach requires a strict separation of autonomous and manual mode, even though the responsibilities of the operator will change in the future as well.



Enabling autonomous electrohydraulic control of pilot-operated off-highway machines

Ben Holter, systems engineering development manager, Husco, USA

This case study details the project conducted at Husco to enable electrohydraulic control of a standard pilot-operated 21 tonne excavator. The study details the challenges in interrupting the operator signal to provide precise digital control of the excavator. Utilizing the installed control system, Husco was able to test and validate autonomous and augmented functions on the machine. The presentation will detail the controller, sensors, hardware and software that were packaged into the machine, and the future direction of the project.



High-accuracy guidance of autonomous vehicles

Yann Roussel, business manager OEM GNSS and mobile mapping, Topcon Positioning Group, France

As a leading supplier of surveying equipment and machine control positioning solutions, Topcon Positioning is now going a step further with the introduction of global GNSS Correction Service, Topnet LIVE. The presentation will explain how Topnet LIVE offers surveying accuracy positioning to OEM partners and in particular how this technology is applicable to autonomous vehicle guidance. It will describe how the infrastructure of the global GNSS correction service is organized, its key components and also how the correction data is broadcast to the moving vehicles, either by cellular or L-band.



The future of edge security for autonomous transportation

Christopher Autry, chief executive officer, Iothic Ltd, UK

As the means to authenticate internet trust, the UK intelligence agency, GCHQ, developed the Public Key Infrastructure (PKI) as a robust security model. PKI is now the single most dominant security protocol used for authentication, but it is mathematically complex, CPU intensive and not designed for a decentralized IOT environment. IoT is the foundation of the automated future, but its serious impediments remain security and interoperability. The presentation will introduce academic research and development and industrial application that have produced an achievable model of security and interoperability, specifically for autonomous transportation, smart cities, critical infrastructure and Industry 4.0.



Panel Discussion

What are the technical, legal and human factors that will delay the implementation of autonomous industry vehicles and how do we overcome them?



DAY 2 THURSDAY FEBRUARY 14

Autonomous mobility: the opportunity beyond cars

Dr Khasha Ghaffarzadeh, research director, IDTechEx, UK

All eyes are on the big ultimate prize: autonomous cars. However, this risks neglecting the growing and diverse opportunities that already exist beyond on-road passenger cars. This talk considers the rise of autonomous mobile robots in agriculture, warehouses and the delivery chain as well as in homes and commercial spaces. It will show that autonomous mobility is transforming the way we envisage vehicles in all these sectors, giving rise to new products, technologies and even business models. It will also show how unmanned mobile robots will increasingly leave behind structured environments to enter more aspects of daily life.



Taking autonomous vehicles from R&D to mass adoption

Markus Prison, director of business development, Europe, Quanergy Systems Inc, USA

With more attention than ever placed on the development of autonomous vehicles, modern consumers are increasingly familiar with lidar sensors, but few realize that the self-driving prototype vehicles that they see today with large spinning sensors are likely not the autonomous cars that will be in their driveways. The sensor that will come standard in every sedan and SUV will be solid state – much smaller, significantly lower cost, and immensely more reliable. This presentation will discuss how self-driving technologies will be integrated into commercial and privately owned vehicles over time, and what this means for key industry stakeholders.



Putting high-performance computing in the driver's seat

Fritz Ferstl, chief technology officer, Univa Corporation, USA

High-performance computing (HPC) is a critical component in creating and managing self-driving automobiles, and is used for the design, engineering, validation and ongoing management of these highly complex vehicles. Furthermore, autonomous vehicles will be driving down the highway transmitting an extraordinary amount of sensor data that needs to be analyzed. This paper will discuss the different types of workloads used in the design, training and validation of this next generation of transportation. The paper will also explain how machine learning can be deployed, including how Kubernetes and Univa's Grid Engine software run alongside each other to manage diverse workloads.



Advantageous design of control systems for autonomous and automated vehicles

Alexander Holler, general manager electronics division, Inter Control Hermann Köhler Elektrik GmbH & Co KG, Germany

Autonomous vehicles like AGVs operating in highly automated harbors, or supply vehicles moving material in and out of mines and tunnels, are already common. Furthermore, partly or fully autonomous operation is feasible for applications that are based on manual control. This presentation will provide an overview of which approaches have enabled efficient design of a control system for such assisted or autonomous industrial vehicles, with special consideration of their safety requirements. This includes recommendations and examples of safe hardware structure, safe software architecture, selection of the most suitable programming language, and supporting tools.



Map data as an essential element of the HAD sensor set

Christian Hering, product manager automated driving, Elektrobit Automotive GmbH, Germany

Bringing automated driving on board off-highway industrial vehicles routes is a highly complex task that requires capable hardware and software. For a safe and comfortable experience, autonomous off-highway vehicles need to anticipate the way ahead. They need HD map data that increases the limited range of onboard sensors by amending digital route data. This map will work as an additional sensor inside a complex network for HAD, providing detailed data about the localization and the route ahead to the software system steering the off-highway vehicle. By basing this HAD sensor on a worldwide-recognized standard, the complexity of the software system will be reduced



Challenges of introducing autonomous vehicles in companies' production systems

Baard Rosvik, business development manager, Semcon Devotek, Norway

With autonomous vehicles becoming available, the challenge of putting them to work demands integration between autonomous vehicles and a company's production and warehouse systems. Coordination has traditionally been performed by trained individuals whose experience and knowledge are key to the overall system performance, but now coordination of the fleet is shifting from machine operators to the system. Can new 'system' suppliers and technologies like machine learning and artificial intelligence help to solve this gap?



Hazard and risk analysis in Level 5 autonomous vehicles

Paria Amini, functional safety engineer, ROSAS Center Fribourg, Switzerland

To determine Automotive Safety Integrity Level (ASIL), ISO 26262:2011 suggests hazard and risk analysis by risk graph that contains three criteria: severity, exposure and controllability. Controllability is defined as possible controllability of hazardous events by the driver or by the person potentially at risk, but there is no driver to control risks in autonomous vehicle (AV) Level 5. Drivers are replaced by ADAS or some type of logic control system in AVs. This presentation explains how ADAS can play an important role as a controllability factor in hazard and risk analysis to determine the ASIL of AV systems.



Control systems create new value in a forestry ecosystem

Arto Orava, manager, research and platform development, Epec Oy, Finland

A cut-to-length forest harvester is an advanced mobile machine in terms of automation and digitization. However, since the forest can be a complex working environment, an operator's skills in using the machine still have a great impact on productivity. Novel sensors like lidars are key enablers for operator assistance systems, needed to increase average productivity and lower the operator's workload. Additionally, sensor data collected by a forest machine can potentially enable new business models in a forestry ecosystem. In future, application of new technology will change the role of a control system from low-level control to higher-level vehicle management.



*This program may be subject to change

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ivT EXPO

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Discover the next generation of industrial vehicle components, materials, concepts and manufacturing technologies

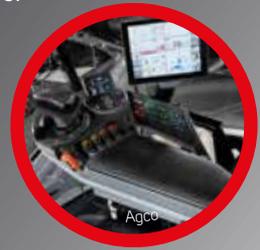
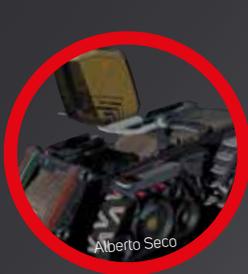
REDUCE EMISSIONS | INCREASE ELECTRIFICATION | IMPROVE OPERATOR SAFETY & COMFORT | BOOST VEHICLE AUTONOMY & EFFICIENCY

While you are in Cologne: From February 2019, the industrial vehicle industry will have an international exhibition that showcases nothing but the latest and next-generation components and technologies. The free-to-attend exhibition, which is closed to the public, will feature around 100 exhibitors, providing a compact, hassle-free environment tailor-made for serious discussion and business, without any of the logistics issues that go with very big events.

No full vehicles will be on show: **ivT Expo** will only showcase the components, services and technologies from Europe and all over the world that go into making the next generation of industrial vehicles, plus a range of manufacturing and assembly technologies.

ivT Expo will bring to life the pages of the market-leading Industrial Vehicle Technology International magazine. Visitors will discover new materials; new engine technologies, including electric motors and hybrid applications; new control systems that question the need for hydraulics; sensors; testing and validation services and technologies, from durability rigs to EMC and NDT technologies; cabin equipment; the technologies required for operatorless/driverless vehicles; and innovative ideas that will help manufacturers of industrial vehicles ultimately improve product design, efficiency and thus sales. The expo will also feature companies displaying the latest and next-generation manufacturing and assembly technologies for industrial vehicles.

Vehicle categories covered by **ivT Expo** are anything from off-road loaders, mining equipment and diggers, to tractors, cranes and lift-trucks. In short, technologies and services for every class of industrial vehicle will be on display.



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A brand-new conference for 2019 entirely dedicated to next-generation cabin design and future technologies for industrial, commercial and off-highway vehicles.



A new conference dedicated to exploring the latest and next-generation designs and technology for reducing CO₂, meeting future industry emission targets, improving performance, and increasing reliability and productivity.



The world's only conference exclusively dedicated to the design and development of electric and hybrid vehicle technology for the construction, agricultural, industrial and off-highway vehicle industry.

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