Workshop Day – Tues 20th Sept

AutoSens

Time	
08.30	Refreshments
09.00	Mahy Room: IEEE Working Group - Automotive Image Quality Standards Chair: **Robert Stead, Managing Director, Sense Media Group, UK**
12.00	Mahy Room: Self Driving Track Days - Team creation networking meet-up Organiser: **Alex-Lawrence-Berkeley, Co-Founder, Self Driving Track Days**
14.00	Mahy Room: Workshop - Advanced sensing and image processing for automotive applications **Dr Albert Theuwissen, Founder, Harvest Imaging** — Exhibition Set-up 14.00 - 17.00
17.30	**Attendee Registration and Welcome Reception** 17.30- 19.00

Conference Day 1 – Weds 21st Sept

AutoSens

Time	
08.00	Registration and Refreshments
09.00	Opening Remarks from the Organisers and Chairman of the Advisory Board **Robert Stead, Managing Director, Sense Media Group, UK** **Prof Patrick Denny, Senior Expert, Valeo Vision Systems, Ireland**

MEZZANINE ROOM

STATE OF THE INDUSTRY: THE ROUTE FROM ADAS TO AUTONOMY

09.15 What's going on in the ADAS ecosystem?
• The last 12 months in autonomous vehicles
• Comparing future mobility strategies: ADAS vs Autonomy vs Shared Mobility vs New Mobility
• What do consumers really want from their car of tomorrow?
• 5 self-driving pain points to resolve in the next 5 years
Dr Alain Dunoyer, Head of Safe Car, SBD, UK

09.45 Sensing and Perception Technologies for Automated Driving – Road from Concept to Production
• State of the art in perception systems
• Scenarios for optimising the sensor mix & factors to consider
• Connecting engineering disciplines – keys to successful collaboration
• Future challenges for vehicle perception
Dr Wende Zhang, BOM Family Owner of Viewing Systems, General Motors, USA

10.15 Unravelling regulations, incentives, compliance and other influences in the world of autonomous vehicles
• Government frameworks and development roadmaps in US, EU and Asia
• Safety Certification – EuroNCAP, JNCAP, NHTSA, Latin NCAP, Global NCAP
• Industry associations
• Regulations and Standards – ISO26262 etc.
• Insurance – overview of the latest thinking on liability issues for OEMs
• Connectivity and Cybersecurity
• Road Testing for Autonomous Vehicles
• European ADAS Legislation for trucks and buses (EC 661 / 2009 AEB & LDW)
• US V2V mandate being prepared
Dominique Bonte, Managing Director and Vice President, ABI Research, Belgium

10.45 Morning Coffee

MEZZANINE ROOM	MINERVA ROOM	MAHY ROOM
DEVELOPMENTS IN CAMERAS, SURROUND VIEW AND MIRROR REPLACEMENT	SENSOR TECHNOLOGIES AND STRATEGIES FOR ADAS	PROCESSING TECHNOLOGIES FOR ADAS AND AUTONOMOUS
Chair: Patrick Denny, Valeo Vision Systems	Chair: Dominique Bonte, ABI Research	Chair: Goksel Dedeoglu, PercepTonic
11.30 Development and trends of mobile cameras that could impact automotive vision • Technology innovations in camera application, impact of commoditization and what can transfer to automotive • ADAS camera innovations that can follow the mobile commercialization model • Breakthrough technologies that will be needed by Autonomous Driving and what could be the added value of developments in mobile imaging **Pierre Cambou, Activity Leader Imaging, Yole Développement, France**	Assessing future opportunities and challenges with LiDAR adoption for vehicle perception • State of play – current devices, costs, and forecast developments • Advantages of LiDAR-enabled perception • Technical challenges for LiDAR – interference, form factor etc. • Alternative technologies / approaches and future outlook **Dr Ariel Lipson, Senior Optics Researcher, General Motors, Israel**	Understanding the state of the art algorithms for computer vision and machine learning including those most important for the automotive industry • Evaluating the best, currently available, computer hardware to run such algorithms, from CPUs to GPUs to DSPs and FPGA hardware • Optimising the key algorithm kernels, such as SGEMM for ML, on the different forms of computer hardware • Proposing new forms of programmable computer to complement what is already available **Rune Holm, Principal R&D Engineer, ARM, UK**

Time	Column 1	Column 2	Column 3
12.00	3D depth-sensing for automotive: bringing awareness to the next generation of (autonomous) vehicles • Recent developments in depth sensing technology • Current and future applications for 3D depth sensing • Performance characteristics and limitations in exterior and interior environments • Challenges for sensors, and sensor fusion with other data **Daniel Van Nieuwenhove, CoFounder and CTO, SoftKinetic, Belgium**	Novel LiDAR sensing technology: results from new tests and road trials • Breakdown of the AEB application requirements (pedestrian and vehicle), based on the Euro NCAP requirements • Sample of data collected with an example AEB implementation on a vehicle • Introduction to object detection, trajectory estimation and AEB function implementation • Advantages over RADAR, and benefits of sensor fusion of LiDAR with camera • Implementations of high performance Flash Lidar and micro-mirror scanned Lidar for highly automated driving applications **Pier-Olivier Hamel, Product Leader, LeddarTech, Canada**	Visual processing crucial to ADAS: applications, architectures and algorithms • The opportunity: sensors and visual processing are the key components for future cars • Where do the visual processing SOCs that drive these ADAS in the car go and what do they do? • What are some typical characteristics of these computer vision algorithms? • What are typically different visual processing system-level architectures? **Marco Jacobs, VP of Marketing, videantis, Germany**
12.30	Brand New Next Generation Automotive Image Sensor **Tarek Lule, Chief Imaging System Architect, STMicroelectronics, France**	New LIDAR sensing system – product performance data • LIDAR system & building blocks • Market needs (integration, ASIL, ….) • Technology needs (automotive, packaging, integrated detectors, mixed-signal design, …) • Product example: a light-to-distance sensor IC **Gaetan Koers, Product Manager, Melexis, Belgium**	Multi-core processing approaches for autonomous vehicles • Outlining ADAS specific requirements (high performance, safety, security, artifical intelligence, ….) • Multi-core vs alternative processor technologies • Advantages and disadvantages • Conclusion **Stéphane Cordova, Director, Embedded Technology Business Unit, Kalray**
13.00	Lunch		
14.30	PANEL: "Why do we need standards for automotive imaging?" CHAIR: Prof Patrick Denny, Senior Expert, Valeo Vision Systems **Tasja Berghaus, Specialist Development, BMW, Germany** **Margaret Belska, Chair, IEEE P1858 Camera Phone Image Quality (CPIQ) Workgroup** **Prof Alexander Braun, Professor of Physics, Duesseldorf University of Applied Sciences, Germany**	Low Cost LiDAR System Design Considerations • Sensor, optics, and laser system design consideration for low cost LiDAR modules • Proven techniques for achieving 100-300m ranging in bright light with low reflective targets • LiDAR software modeling for system performance evaluation • SiPM, SPAD, APD, Pin Diode sensor options – pro and con use models **Dr Carl Jackson, CTO, SensL Technologies, Ireland**	Autonomous driving/ADAS vision accelerator design with primary focus on enabling CNN in a low power device • Role of deep learning in ADAS algorithms • Typical workload for these algorithms • Deep learning architecture in embedded system • Tools for enabling deep learning systems in automotive platforms **Mainak Biswas, Sr Staff Engineer, Qualcomm, USA**
15.00	Bio-inspired Method Addresses Speed, DR and Power Efficiency Limitations of Image Sensors – New Test Results • Bio-inspired image sensors driven by dynamic scene changes • Scene-dependent, self-adjusting sampling rate and exposure time • Setting new standards for speed (1 Mio fps), dynamic range (>120dB), sensor-level video compression (1000x) and power efficiency (<10mW) • New test results from automotive trials **Luca Verre, CEO, Chronocam, France**	Evolving RADAR: from ranging and detection to true perception • The promise of CMOS radar • Post-FMCW waveforms • From 79 GHz to 140 GHz radar • Machine learning and sensor fusion **Wim Van Thillo, Program Director, Perceptive Systems for the Intuitive Internet of Things (I2oT), IMEC**	Review of developments in deep learning – analysis of strengths and weaknesses • Cutting through the hype of Deep Learning – what is it really useful for? • Challenges in using Deep Learning in automotive, safety critical applications • Future pathways, required research and the role of Deep Learning in the mix of computer vision approaches **Dr Goksel Dedeoglu, Founder and CEO, PercepTonic, USA**
15.30	Afternoon Coffee		
16.15	CPIQ Update and the Case for Image Quality Standards in Automotive • Outline of CPIQ image quality standards • Relevant elements that could be applicable for automotive imaging • Benefits standard work is projected to bring in the cameraphone market **Margaret Belska, Chair, IEEE P1858 Camera Phone Image Quality (CPIQ) Workgroup, USA**	A low-cost and innovative radar "digital eye" • Previous deployment of beam-steering radar • Novel use of metamaterials to enable a significant reduction in size, weight, power and cost • Maintaining high signal-to-noise ratio and high-resolution simultaneously **Dr Bernard Casse, Area Manager of the Metamaterial Devices, Hardware Systems Laboratory, Palo Alto Research Center (PARC), USA**	Exploring vision-based security challenges for AI-driven scene understanding **Ian Goodfellow, Senior Analyst, OpenAI** **Nicolas Papernot, Google Research**
16.45	The Necessary Open Standards enabling Vision Processing in ADAS • The benefits of Open Standards and relevance for automotive vision processing • Bringing OpenCLTM and SYCLTM into the frame • Faster development and high performance with Codeplay's vision library **Dr Andrew Richards, Founder and CEO, Codeplay Software, UK**	Turning complexity on its head – how to take the simplest route to autonomous vehicle control • Is building the most complex and detailed environmental model necessary? • What happens if we only gather the bare minimum of required data for a specific function.. • Power and processing efficiencies of the minimalist approach **Max Ruffo, CEO, Terabee, France**	PANEL: "What role will AI play in the future of autonomous vehicles and ADAS?" **Jeff VanWashenova, Director of Automotive Market Segment, CEVA** **Ian Goodfellow, Senior Analyst, OpenAI** **plus invited guests**

17.15	ADAS Front Camera: Demystifying Resolution and Frame-Rate • Review of front camera system design and components, performance parameters • Resolution trends for sensors and impact of resolution in object detection capabilities for ADAS • The importance of frame rate in ADAS cameras and future scenarios for increased performance **Mihir Mody, Senior Principal Architect, Automotive Processor, Texas Instruments, India**	Sensing technology for autonomous vehicles • Update on the Drive Me project • Challenges for sensing technologies in autonomous vehicles • Overview of the applicable technologies related to sensors and sensor processing **Henrik Lind, Technical Expert, Volvo, Sweden**	Towards stable visual odometry & SLAM solutions for autonomous vehicles • Why is SLAM a hard problem? • SLAM Architectures • Modularity and Extensibility • Visual Odometry **Dr Petros Kapsalas, Senior Vision Research Engineer - ADAS Department, Panasonic Automotive, Germany**
17.45	Closing Remarks	Closing Remarks	Closing Remarks
18.00	Reception @ Blue Boulevard		

Conference Day 2 – Thurs 22nd Sept

08.00	Registration and Refreshments		
09.00	Mezzanine Exhibition: Official Opening of Conference Day 2: **Alison Rose, British Ambassador to Belgium** **David Schoenmaekers, Federal Public Service Mobility and Transport, Belgium**		
09.15	Opening Remarks from the Chair	Opening Remarks from the Chair	Opening Remarks from the Chair
	MEZZANINE ROOM	**MINERVA ROOM**	**MAHY ROOM**
	IMAGE QUALITY STANDARDS IN AUTOMOTIVE VISION	SAFETY, TESTING AND VALIDATION	GLOBAL CASE STUDIES OF AUTONOMOUS VEHICLES
	Chair: Sven Fleck, SmartSurv and Benjamin May, AMX13	Chair: Phil Magney, Vision Systems Intelligence	Chair: Pierre Cambou, Yole Développement and Martin Edney, Jaguar Land Rover
09.20	Dealing with the Complexities of Camera ISP Tuning • Comparing automotive image quality to other imaging applications • Challenges of tuning and balancing trade-offs • Case examples and methodologies for tuning camera systems to improve image quality **Clement Viard, Image Science Senior Director, DxO Labs, France**	Filling the gaps in vehicle automation definitions – Near-accident vehicle automation • Development history and current status of automated vehicle guidance levels • Near-accident interventions – how and where should this be included? • Resolving inconsistencies within current definition models • Enhancing visibility of near-accident functions, how this can help drive improved ADAS in the short term **Tom Michael Gasser, German Federal Highway Research Institute BASt, Germany**	Understanding ADAS and autonomous vehicle demands in India • Key facts about the automotive market in India • Consumer perceptions of ADAS and contrast with Europe, US • Balancing ADAS technology with the consumer model • Operational challenges for ADAS systems in the Indian operating environment • Defining the opportunity in one of the world's biggest markets **Vamsi Krishna Sistla, ADAS-Tech Lead, Tata Elxsi, India**
09.50	Challenges with video camera image quality in functional safety for autonomous driving • Why image quality must be considered in the context of safety-critical applications • Understanding image quality requirements during scene transition scenarios • Addressing challenges posed by modulated light scenes • Managing contrast loss in HDR scenarios **Ulrich Seger, Development Next Gen Video Sensor, Optics and Sensor Signal Processing, Robert Bosch, Germany**	ADAS & Autonomous Driving Testing, Regulation & Homologation • Review of regulations and working groups – including UNECE WP 29, ACSF, and ISO TC22 • Understanding the state of R&D to identify safety keypoints • Proposed testing scenarios, project case studies • Future testing and homologation roadmap for ADAS and Autonomous Driving functions **Alain Piperno, Autonomous Vehicles Testing & Homologation Leader and Safety Expert, UTAC-CERAM, France**	The world's first deployed fully autonomous vehicle • The rapid rise from start-up to deployment – 5 key lessons learned along the way • System architecture of NAVYA ARMA – design considerations and technical outline • Analysis of collected operational data, conclusions and how this can be applied **Pascal Lecuyot, R&D Project Manager, NAVYA, France**
10.20	From dust to data – managing image quality in driver assistance applications • Sources of image quality defects in camera-based ADAS • Linking optical parameters to system function • Designing a test fit for purpose **Prof Alexander Braun, Professor of Physics, Duesseldorf University of Applied Sciences, Germany**	Simulating sensors using state-of-the-art computer graphics • 3D simulation of urban environment and sensors • multi-camera set-up: stereo vision, 6 camera surround view • LIDAR and depth map: how they work **Arpad Takacs, Outreach Scientist, ADASWorks, Hungary**	EasyMile - lessons learned from our global experiences • The development story - choices we made, what we would do differently • Challenges of the past and the future with system and software architecture as autonomous functionality increases • Variations in geographical operating environment (environmental and cultural) and how these influenced vehicle function and design • Lessons learned from field operations, how can these be applied for next generation vehicles **Gilbert Gagnaire, Founder, EasyMile, France**
10.50	Morning Coffee		
			VEHICLE NETWORKING AND INFRASTRUCTURE

11.30	Surround View Systems – Evolution and Emerging Trends • Review of early and current surround view systems • Overview and comparison of existing solutions • Ethernet based SRV systems • FPD Link/LVDS Based systems • Centralized Image Processing Systems • Edge /Remote Image processing Systems (Smart sensors) • Emerging trends and need for analytics in SRV **Shashank Dabral, Architect/Algorithms Lead – Automotive Imaging & Vision, TI**	Challenges with validation for sensor fusion systems • Evolution of sensor fusion • Why is validation difficult for sensor fusion? • Evaluation of current approaches to system validation • Ideas on the validation approaches of tomorrow **Robin Schubert, CEO, Baselabs, Germany**	Novel optical fibre soltions for vehicle networking **Peter Stratmann, Head of Technical Sales, Fujikura**
12.00	Multi-Camera On-The-Fly Calibration for Surround-View Systems • State-of-the-art surround-view systems in BM/AM • On-the-fly camera calibration technology for Surround-view systems • Surrond view based ADAS applications **Dr Zhencheng James Hu, CEO, Wissen Intelligent Sensing Technology, China**	ISO26262 design considerations for automotive image sensors • Why camera safety has to start with the image sensor • Safety Architecture of an image sensor • State of the art fault injection simulations for image sensors **Mike Brading, Technology Strategist, ON Semiconductor, USA**	Disruptive automotive technology for megapixel video imaging • HDTVI technical detail including signal timing, bandwidth allocation, encoding scheme and etc. • Image quality comparison • Backward compatibility to CVBS • Cable/connector requirement • EMI/EMC performance **Dr Feng Kuo, CTO, Techpoint**
12.30	From Viewing to Doing: Evolution of camera systems from scene viewing to automated parking" • Architectural Evolution • Fusion of ultrasonic sensors and camera • Parking on lines, braking on pedestrians • Localisation and Home Parking **Olivia Donnellan, R&D Map & Fusion Department Manager, Valeo Vision Systems, Ireland**	Where does ISO26262 apply and where does it not? • Update on ISO26262 working group • What is and is not applicable o Illustration via case studies of different ADAS system o Potential future ADAS systems and how ISO26262 would apply • Perspective on future developments for functional safety in automotive **Alex Myakov, Chief Computer Vision Advocate, Intel**	PANEL: "Future strategies for vehicle networking and power/data transfer infrastructure" **Martin Edney, Lead System Engineer, Jaguar Land Rover** **Dr Feng Kuo, CTO, Techpoint** **Markus Dorfner, R&D Project Manager, Fujikura** **and selected guests**
13.00	Lunch Including AutoSens Accelerator		
	MEZZANINE ROOM		
	FUTURE STRATEGIES TOWARDS AUTONOMY		
	Chaired by Organisers and Chairman of the Advisory Board **Robert Stead, Managing Director, Sense Media Group, UK** **Prof Patrick Denny, Senior Expert, Valeo Vision Systems, Ireland**		
14.15	**AutoSens Accelerator** - 3-minute Pitches from our selected Start Ups: Jerome Wertz, **Phasya** Anjo De Heus, **Yado-VR** Robert De Souza, **CardioID** Claude Florin, **Fastree3D** Robin Streiter, **NAVENTIK** Kris De Meester, **Xenomatix** Arshia Gratiot, **The Third Space**		
14.45	Building passenger comfort into autonomous vehicles via user-centric design and sensor data • How will occupant behaviour change in driverless cars, what do we need to consider regarding their comfort? • Sensors and data required to build a holistic picture of the passenger • Using perception data to inform better design and vehicle behavior and optimise comfort **Dr Cyriel Diels, Senior Lecturer, Coventry University**		
15.15	Afternoon Coffee		
15.45	The building blocks of autonomy – how technology is evolving in ADAS and beyond • Contrasting the ADAS system components of a typical high end vehicle in 2006 vs 2016 (maybe too long ago, even 2011 vs 2016 would be a big shift) • Expanding technical capabilities – how a once-highly-segmented automotive electronics sector now required players to diversify skillsets and technical competencies • Laying out the current structure of the industry (a walk through the infographic) and key trends • What might the ecosystem look like in another 5-10 years? (merging of technologies, changing requirements e.g. mapping, M&A) **Phil Magney, Principal Analyst, Vision Systems Intelligence, USA**		
16.15	Automotive camera technology and computer vision algorithms • What problems do we face in camera-based automotive systems? • How does algorithm performance depend on imager technology? • What are the requirements towards imager technology? **Dr Patrick Sauer, Senior Engineer, R&D Advanced Technology, Toyota Motor Europe, France**		
16.45	Closing Remarks		
17.00	Close of Conference		