

Special Report / DVN AEB Workshop (9-10.April in Detroit)



DVN held its AEB Workshop in Novi, Michigan on April 9th/10th.

Around 85 people from OEMs, Tier1's and technology suppliers attended, incl. experts of ADAS and Lighting Systems.

We had demo cars from Compal, Valeo, Magna, Adasky and Forvia/Hella driving around showing some impressive thermal camera and object classification demos, as well as exhibits from Compal and Teledyne/Flir.

We will make the presentations that we are allowed to distribute available to members online.

Paul-Henri (CEO, DVN – see picture left) opened the event with some remarks about DVN and our upcoming events in China and Germany.

Key Take Aways

Implementation of NHTSA Rule

- FMVSS NHTSA rule has been confirmed on 20/03/2025 with minor modifications
- The consensus is it will be difficult to change the rule since any change would require an approval of the US Congress.
- One challenge is the short timing plan applying to the complete range of platforms of the OEMs from 2029 (new platforms and existing platforms). This might change.

Contribution of Lighting & vision systems

- It seems unrealistic (and very expensive) to improve the lighting systems and implement these improvements by 2029 on all models. Any improvement would have to comply with the glare issue, which means the benefit will be limited. The easiest way would be to implement ADB to benefit from the high beam when it is possible.

High speed Use Cases and False Positive validation

- One big challenge of FMVSS127 is the high speed AEB Use Cases, which are more stringent than the EU-NCAP Use Cases, with a fail/pass criterion. This might require another sensor on top of the camera whose performance in the dark is limited.
- Some tests of the FMVSS127 use cases have been done with multiple brands and a limited number of models. Only one car passed the new specification, showing the OEMs are not ready.
- The task for the validations of false positive will be huge, simulations will be necessary
- ASIL level: the consensus is it should be possible to keep a ASIL B level for the system

Camera performance and fusion camera / radar

- The front camera has limited performance with the low beam
- Improving the resolution of the imagers might help a bit, the next step is the implementation of split pixels or LOFIC solutions (Omnivision), but the risk to bet on a pure vision system is high. One key will be how much more performance can be squeezed out of the AI detection algorithms.
- Adding a radar might be a good solution, the radar technology is cheap and will improve by using AI software which helps to discriminate static objects (Zendar, Perciv.ai). Of course, there is a challenge retrofit that into existing platforms.
- Magna believes a practical solution to reduce false positives would be to use ADB + camera + radar which are technologies on the shelve at a reasonable cost
- Valeo suggests using a scalable system to avoid betting on one technology and minimize the risk of a dead end during the development.

Benefit of the new technologies (Lidar and camera)

- IR cameras have a good detection performance with pedestrians and would be a good candidate for the NHTSA rule, it seems a 80-100\$ cost should be achievable with high volumes.

- The lidar technology, especially the FMCW lidar with doppler like a radar would be a good technology as well but requires some time before the cost becomes acceptable. If lidar is on the vehicle for other functions anyway, then it can be used for AEB.
- Some OEMs are expected to go with these new technologies (i.e. premium brands or brands promoting a high safety performance)

Program

APRIL 9th - Part-I: ICE BREAKER

- 06:00 PM Welcome Cocktail & democars' test
07:30 PM Standing Dinner on exhibition platform

APRIL 10th - Part-II: CONFERENCE

- 08:15 AM Opening
08:30 AM Keynote(s) - NHTSA Requirements & Challenges
 - **General Motors** - Jodi Allen
 - **MAGNA** - Jan Erik Källhammer, Director of Visual Enhancement and Cognitive Systems09:00 AM Q&A: NHTSA Requirements & Expected Challenges

Session 1- Performance Lighting & Vision Systems

- 09:10 AM
 - **APTIV** - Philippe Troia, CTO-EU - *Impact on Functional Safety of the FMVSS127 requirements*
 - **VALEO** - Joseph Thompson, Regional R&D Director
 - **OMNIVISION** - Jeffrey Morin, Automotive Imaging Solutions Specialist - *Pixel Scaling Automotive Image Sensors*09:55 AM **PANEL-1: Opportunities for Vision Systems**
10:10 AM Coffee Break

Session 2 - Performance of Radars & Fusion

- 11:00 AM
 - **FORVIA HELLA** - Nicholas Williams, Lead Program Manager, Advanced Driving
 - **PERCIV.ai** - Andras Palfy, Co-Founder
 - **ZENDAR** - Antonio Puglielli, VP of Engineering
 - **SABIC** - Carlos Pereira, Chief Scientist - *Optimizing radar transparency of plastics for exterior trim*12:00 PM **PANEL-2: Benefits of FUSION Systems**
12:15 PM Lunch break & democars' test

Session 3 - Performance of IR Cameras

- 01:50 PM
 - **ADASKY** - Bill Grabowski, Head of North America
 - **FLIR** - John Eggert, Global Head of Business Development, Automotive
 - **OBSIDIAN** - John Hong, CEO
 - **COMPAL** - Richard Seoane, General Manager

Session 4 - Performance of Lidars

- **ROBOSENSE** - Scott Skelton, Director, Engineering and Technical Sales - *LiDAR's role in automakers meeting the latest NHTSA AEB rules*
 - **CEPTON/KOITO** - Henri Haefner, Senior Dir. Product Management
 - **Light IC** - Dr Jie Sun, Co-founder
- 03:35 PM
- PANEL-3: Benefits of the new technologies**
-
- 03:50 PM Coffee Break & democars' test

Session 5 - Performance validation, Simulation/Calibration

- 04:40 PM
 - **ANSYS** - Lionel Benes, Lead Product Manager & Aaron Talwar - *Simulation-Driven Development for FMVSS 127 Compliance Using Perception-in-the-loop Testing*
 - **BURKE PORTER** - Brunno Moretti, President ADAS Solutions - *ADAS Sensors Post-Repair: A Hidden Threat To Road Safety*05:10 **PANEL-3: Sensing Architecture & validation**
05:25 CLOSING REMARKS

Exhibitors



Incl. Live demos from Valeo, Forvia/Hella, MAGNA, Compal, Adasky



Speakers – Photo Gallery



GM / Jodi Allen



MAGNA / Jan Erik Källhammer



APTIV / Philippe Troia



OMNIVISION / Jeffrey Morin



VALEO / Dirk Shutle



Forvia-Hella / Nicholas Williams



Zendar / Antonio Pugliatti



Perciv.ai / Andras Pallfy



SABIC / Carlos Pereira



ADASKY / Bill Grabowski



FLIR / John Eggert



OBSIDIAN / John Hong



COMPAL / Richard Soane



ROBOSENSE / Scott Skelton



CEPTON/KOITO Henri Haeffner



LIGHT IC / DR Jie Sun



ANSYS / Lionel Bennes



BURKE PORTER / Brunno Moretti

Participants registered

	First Name	Last Name	Company				
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2	Yongjiang	Li	AGC Automotive Europe	62	Gen	Ohira	NA Lighting / Koito Manufacturing
3	Kevin	Markell	AMS OSRAM	63	John	Hong	OBSIDIAN
4	Michael	Godwin	ams OSRAM	64	Jeffrey	Morin	OmniVision
5	Clemens	Hofmann	ams OSRAM Group	65	Andras	Palffy	PERCIV.ai
6	Joe	Jablonrhi	ams OSRAM Group	66	Scott	Skelton	RoboSense, Inc
7	Lionel	Moretti	Ansys	67	Carlos	Pereira	SABIC
8	Lionel	Bennes	Ansys	68	Connie	Bouchard	Sapphire Technical Solutions, LLC
9	Philippe	TROIA	APTIV	69	Drew	Brown	Sapphire Technical Solutions, LLC
10	Brunno	Moretti	Ascential Tech	70	Karen	Elder	SCHOTT NORTH AMERICA
11	Bhavana	Chakraborty	BOSCH	71	Tina	Gallo	SCHOTT NORTH AMERICA
12	Henri	Haefner	CEPTON/KOITO	72	Fritz	Krainer	Seek Thermal
13	Cosmin	Gheorghiu	COMPAL USA.Inc	73	Andrew	Morris	Stellantis
14	Paul	Ilovan	COMPAL USA.Inc	74	CHA	TASCIOGLU	Stellantis
15	Richard	Seoane	COMPAL USA.Inc	75	LESLIE	BURLEY JR	Stellantis
16	Stuart	Klapper	COMPAL USA.Inc	76	HEATHER	HATHAWAY	Stellantis
17	Rudy	Wilson	COMPAL USA.Inc	77	DENNIS	NOVACK	Stellantis
18	Eric	Amiot	Driving Vision News	78	BENEDETTO	DICICCO	Stellantis
19	Paul Henri	Matha	Driving Vision News	79	Jeff	Page	Stellantis guest
20	Martin	Booth	Driving Vision News	80	Colin	Strate	Sur
21	Felipe	Melhado	Driving Vision News	81	John	Eggert	Teledyne
22	Amogh	Sakpal	fka GmbH	82	John	Eggert	Teledyne FLIR
23	Mike	Vanbelle	Ford	83	Dirk	Schulte	Valeo Brain Division, North America
24	Arun	Kumar	Ford	84	Lidia van	Moen	Valeo Brain Division, North America
25	Corin	Reuter	FORVIA HELLA	85	HH	McConkie	Valeo Brain Division, North America
26	Asif	Vattiparambath	FORVIA HELLA	86	Waqas	Malik	Valeo Brain Division, North America
27	Andrew	Bates	FORVIA HELLA	87	ZHAO	ZHAI	VanJee Technology
28	Ovidiu	Buzdugan-Romcea	FORVIA HELLA	88	Antonio	Puglielli	Zendar Inc.
29	Nicholas	Williams	FORVIA HELLA	89	Sunil	Thomas	Zendar Inc.
30	Devin	Sutherland	Freudenberg-NOK Sealing Technologies	90	Pandey	Abhishek	ZKW
31	Jodi	Allen	General Motors				
32	Scott	Charnesky	General Motors				
33	Elke	Dieter	General Motors				
34	Michael	Larsen	General Motors				
35	Darren	Khan	General Motors				
36	Alok	Fuloria	General Motors				
37	Chad	Zagorski	General Motors				
38	Fabrice	Humeau	GVS FILTRATION inc				
39	Eric	Giddens	Honda Dev. and Mfg. of Am.,LLC				
40	Daisuke	Nakanishi	Honda Dev & Manufacturing of America				
41	Josh	Glazier	Honda Dev & Manufacturing of America				
42	Matthew	Baker	Hyundai				
43	Judy	Cheng	LightIC Technologies USA, Inc.				
44	Jie	Sun	LightIC Technologies USA, Inc.				
45	Gordon	Jiang	LightIC Technologies USA, Inc.				
46	Jan Erik	Källhammer	MAGNA				
47	Michelle	Skaggs	MAGNA				
48	Sogand	Afzali	MAGNA				
49	James	Farell	Magna Electronics				
50	Dominic	Smith	Magna Lighting				
51	Jeff	Mc Williams	MAGNA				
52	Vinicius	Martins	Marelli				
53	Francesco	Coradazzi	Marelli				
54	Colby	Childress	Marelli				
55	Gabor	Fulop	Maxtech International, Inc.				
56	Mike	Janca	Mercedes-Benz R&D North America				
57	Ashraf	Edwila	Methode				
58	Alexis	Blais	Mobileye				
59	Calvin	Hwung	Monolithic Power Systems				
60	Takuya	Inoue	Nissan Tech Center North America				

Meeting Notes

General Motors – Jodi Allen

Next generation AEB has to be done at night with low beams. The camera team wanted 10K lux on 60% of the target at 60m. A typical low beam has good illumination on the road in front of you, but not above zero degrees horizontal. On a low vehicle you have a bigger issue. There are also regulatory maximums you have to meet. Across more than 250 car models, beam patterns have a lot of variations. Lighting is not the solution today !

Magna – Jan Erik Kallhammer

The nighttime low beam challenge is the biggest issue at less than 0.2 lux. There are additional tests in EuroNCAP for turning vehicles car-to-cyclist etc. False brake activation is a problem, even in a reliable system. The regulation does not have any conditions for adverse weather. Tracking a pedestrian with Radar only (beyond the low beam) is a challenge. LWIR cameras do not depend on headlight range and are a good solution. (NHTSA does not use heated dummies but agrees this may be a topic for future consideration. Lidar works but depends on the resolution. Erroneous classification is possible in adverse weather. Gated cameras are a new possibility with high spatial resolution and reasonable depth accuracy. EuroNCAP allows ADB and DOT TTAC agrees that NHTSA should raise its adaptive driving beam rules. IIHS top safety picks are also a consideration. There is no clear consensus on the best solution, but LiDAR and Gated Cameras may be more relevant when also used for other features. Data collection for training and testing takes time and data should be collected with all considered sensors to save development time.

Panel – NHTSA Requirements and Challenges

ADB makes things easier for EuroNCAP – the industry should try to push the US regulations to adopt this. Even if the regulation changes it does not leave much time to equip so many vehicles with the AEB system. NIR is also an option but needs illumination. The Toyota Corolla example passed the testing, but GM is not sure if this was done “robustly”. Retrofitting vehicles that have already been designed is hard.

Aptiv – Phillippe Troia - Sr. Dir. Vehicle Safety

FMVSS127 drives high performance requirements for the industry beyond what xNCAP and GSRV2 Europe requires. Drivers may complain about AEB features if there are too many false positives. ASIL safety level testing will also be a challenge. The perception stage is becoming the primary step with time to react (e.g. brake) is becoming a secondary step. Fusion adds time to the perception stage. OEMs should avoid tuning to only pass the tests and not forget robustness. Quick perception will be a key.

Valeo – Dirk Schulte – Dir R&D

All vehicles will have to be compliant, no collisions are allowed, there is only one pass attempt and nighttime with low beam is a major challenge. No current systems pass these tests. FMVSS No. 127 will probably impact other regulations worldwide. One option is to improve the performance of current sensors (vision and/or radar). LiDAR and thermal camera are not going to be seen in entry level vehicles. Headlamp design may help as well as push-back on the regulations. For Car To Car AEB, the challenge still remains with false positives using vision only systems. For Car to Pedestrian testing, nighttime low beam performance remains the main weakness of a vision only approach and cameras have a bigger blind zone with high hood-line vehicles like trucks. Valeo has produced more than 30M smart front cameras since 2019 and was the 1st vision-only system to achieve a 5* NCAP rating. The Valeo Smart Safety 360 system is scalable from entry to L2+. The smart front camera contains central compute and ultrasound, radar, DMS and other features can be added. This provides the advantage of a single hardware platform

than can scale from entry level to L2+. The system can also be L3 ready where the OEM may want to add long range radar, lidar and thermal cameras.

OmniVision - Jeffrey Morin, Automotive Imaging Solutions

An automotive grade, large pixel, high resolution sensor can be expensive. Pixel scaling is an effective way to reduce cost. A high SNR is desirable with enough resolution to cover the detection range and enough DR to see bright and dark areas at the same time. Jeff showed some videos of cameras with different SNRs – at SNR=1 you see quite well in the dark. Pixel scaling is reduced pixel size for lower die size -but there are tradeoffs to performance. We have gone from 6um pixels in 2012 to 2.1um today – mobile phone sensor pixels are smaller but also decreasing at slow rates. Automotive sensors must work over larger temperature ranges with higher SNR. AEB needs more than 120dB of dynamic range. Single exposure DR is ideal for FMVS127. The camera also needs to do LED Flicker Mitigation which can degrade image quality. LOFIC pixels have larger full well capacity than traditional pixels. In 2026 Omnivision will get to sub 2um pixels and approach 1um by 2030. Considering all of the tradeoffs – the ideal solution for FMVS127 is probably an 8MP, LOFIC capacitor based sensors with 2um pixels.

Panel – Opportunities for Vision Systems.

Detection time is limited which impacts sensor fusion.

There is no consensus on the ASIL level for the AEB system. Going up a level adds costs.

For the higher speeds, Valeo is trying to keep the systems at ASIL B. Beyond low beam you don't have sensor fusion and hence you don't have redundancy.

OEMs in general are moving towards central compute. The Valeo camera system that was shown provides "mini" central compute in the smallest unit possible. For L3 (or even some L2++) a larger central compute is needed – which sometimes also integrates the IVI function.

The camera FOV will also dictate range. GM calculates 7.6 degree FOV is required at 50M. But to meet side pedestrian standards at slow speed you need a much larger FOV.

Cleaning systems will be key for adverse weather performance. Even spray on the radar dome is an issue. Phantom braking chances are worse and even if you don't need to meet the FMVSS standard in bad weather, you still need to test for it. Depth sensing with the camera in bad weather is a challenge.

Forvia Hella – Nicholas Williams, Lead Program Manager

Forvia Hella is the #2 supplier of radars. Average Driver reaction time is less than 0.7 sec. They showed a test case of a pedestrian coming from behind 2 parked cars while driving at 30km/h. Some of the test parameters have been changed as of March 20th. At 50km/h you need 0.7 sec system latency to react. FH's 7th generation radar is key to achieving FMVSS 127 – using micro-doppler for fast object classification and deep neural networks for AEB scenarios. A key advantage to using FMCW radar is instant velocity information.

Perciv.ai – Andras Palffy, Co-Founder

Radar is the most robust and affordable sensor available that works well at night; however it is traditionally not good at perception/classification. Perciv uses software to elevate perception capability of radar. Perciv is a start-up that is 2 years old and is already working with ZF and Arbe. The software can estimate object motion which allows to better predict their movement. They can also do drivable free space estimation and occupancy grid map.

About 2 TOPS is required for compute. Radar plus AI can do much better than we thought. They showed a demo of the radar perception at night versus camera detection using Yolo V12. Under unusual lighting conditions (glare, flashing) the camera struggles to detect pedestrians. Fusing radar+AI with RGB or thermal camera makes for a complete system.

Zendar – Antonio Puglielli, VP of Engineering

The keys to FMVSS 127 are not just to pass the tests, but to have zero phantom braking and achieve a low cost. Cameras are widely used but have challenges at low light and in adverse weather. Radar is better in those challenging environments but is poor at detecting stationary objects. It also requires less compute cycles and works better at long range. Stationary object blindness limits ADAS safety and reliability. Cars parked under a bridge for example is a problem. Zendar uses off the shelf radar and uses AI to detect objects, They are able to pass all of the FMVSS 127 tests. The AEB software and ECU currently adds about \$90 to the cost of a car already equipped with radar, and this can be scaled down to around \$25 with a next generation single chip processor.

SABIC – Carlos Pereira, Chief Scientist

There is a problem with radar placed behind plastic trim due to the dielectric effect of plastic. Thickness needs to be optimized for radar to minimize reflections. Plastics also use additives to make it stronger, so the DK value varies. Production variation is +/- 3%. If you use recycle material, DK can also vary. Paint is also bad and color affects dielectric behavior. If you paint cars after an accident, it can also affect the radar image. The key takeaway is that plastic component design must be optimized for radar performance.

Panel – Benefits of Fusion Systems

The cost of the software is the value add of the solution. If the car already has sufficient processing power, there is no additional cost for that.

A radar only solution can be robust enough to avoid phantom braking, so fusion with camera images is not a given for that. Does it achieve redundancy? Hella proposes a fusion approach to increase user trust. While it's possible to fuse the data, Zendar argues that is not always the best approach.

Zendar is using standard MMR radars with 3° horizontal resolution (and poor (20°) vertical resolution). Enough dynamic range is possible to detect pedestrians to trucks.

Radar in the lighting system has the advantage you do not need to worry about paint. Polycarbonate coatings are pretty radar transparent.

Is perception possible at high speed and beyond 100M? Radar is much better at doppler and range, so speed matters less for classification.

Testing is already starting to meet the 2029 requirements. Simulation will be required to complete validation since it will not be possible to have a fleet large enough driving in all conditions.

Eric spoke about the DVN L2+ ADAS test that we plan to conduct in China. Please contact one of us for more details.

Adasky - Bill Grabowski – Head of North America

40,000 people are still dying on the roads in the US every year. The industry does need the help of regulatory bodies and consumer groups to improve safety. Some of the more safety oriented OEMs also help drive this; in particular, Mercedes, Subaru and Volvo. Progress has flattened out since around 2010. Pedestrian deaths at night have in particular spiked. Hands free driving is also coming that is not regulated

or standardized and usage is limited because of this. Snow, rain and fog should not be considered edge cases. Thermal LWIR is elegantly simple and performs in all weather. The Adasky solution is small, lower power and comes with a complete software stack. Occluded pedestrians can be detected, children at night and the cameras work well in sun glare, fog and high contrast simulations. Costs are also dropping and are on a path to a \$100 level.

Teledyne Flir – John Eggert, Dir Automotive Business Development

The voluntary AEB standards today cover virtually none of the pedestrian fatalities, and FMVSS 127 covers just under 50%. Increasing the speed to 50mph would also increase coverage to 70%. Flir tested occluded child at 50kmph, stationary pedestrian at 55kmph and crossing at 60kmph. They compared against performance of 8MP Sony camera and Smart Micro Radar. Heated pedestrian targets were used. The visible cameras were even failing the daytime test scenarios. Surprisingly, even the radar equipped vehicle had failures in the daytime. During the daytime, the thermal camera performs roughly the same as the visible camera – and night it has 2-3x the range. Less aggressive braking can also help avoid a rear end collision.

Obsidian – John Hong, CEO

In addition to pedestrian collisions, there are 2 million animal collisions per year with an estimated \$8B cost. There is no better way than thermal to see at night. Both FOV and Range are important. Drones and security are also important markets. High cost of the sensor has been a barrier to wider adoption. Moving from 8" silicon wafers to LCD glass substrate is the key to reduce cost. Measured as \$/mm² it is 50x cheaper than silicon. Obsidian separates the read-out IC from the micro-bolometer array with thermal isolation between the IC and the array. Obsidian uses Innolux and JDi in Japan for manufacturing. They are currently building 24um pixel pitch (VGA) sensors and plan to increase the resolution to 4K by 2029. The ROIC can be built using 28nm CMOS and add other functions like ISP.

Compal USA – Richard Seoane, GM

Compal is a \$28B company focused on high volume electronics manufacturing with a global manufacturing footprint. Infrared Technology Systems is based in Indiana. Innovation is driving pixel density and costs down. Even with reflective clothing, current camera based systems fail. IR doesn't care what you are wearing. Compal has developed a classification, distance and tracking software that works with RGB and IR. IR works well with cut-in scenarios and has advantages in eye safety and power. The \$100 target is achievable and can exceed the FMVSS 127 requirements.

Robosense – Scott Skelton, Dir Engineering and Technical Services

Oems are concerned with high speed collision avoidance, low light pedestrian detection, avoidance of false positives and ease of integration into existing vehicle platforms. Vision only systems have challenges in many edge cases. Radar solves some of these challenges but filtering out all of the noise can be a challenge as can be never before seen moving objects. Lidar performs well in the dark and with dynamic lighting conditions and deals well with headlight glare. Even the lower cost (\$200) lidars coming to market now can see at 200m range giving more comfortable deceleration. Robosense has its own camera/radar fusion software that can significantly reduce false positive rates. A Swiss RE study shows up to 29% reduction in incidents for L2+ driving when lidar equipped. Performance in weather is marginally degraded but still works in rain, fog and snow,

Cepton/Koito – Henri Haefner – Sr. Dir Product Management

Cepton is now part of the Koito group. The number of vendors engaged with automotive lidar has dropped but lidar can still contribute to improve the performance of autonomous driving systems. For Autonomous

Drive there is no driver to fall back on. False negatives are not acceptable which means sensor redundancy is probably needed. FMVSS127 also does not allow any false negatives and there is no more simple warning for false positives – you must actuate the brakes. With higher detection thresholds to avoid false positives you may miss an object. Lidar can shift the false positive/false negative curve to make for a safer system and better driver experience. Resolutions at distance are much better than radar, so for example detecting objects smaller than 2M at 100M range is hard with Radar. Lidar is much better than camera and radar for false negative rates.

Light IC – Jie Sun , Co-founder

Lidar offers better resolution than radar. Conventional lidar does not have doppler velocity today, but FMCW solves this problem. Light IC has silicon integrated photonics with up to 230M range , 120x25 FOV and 1.5Mpps. Multiple Tx/Rx modules are on the same chip. Radar point cloud is sparse, but only a few points are needed to identify and track objects. With ToF lidar, more points are needed to track objects. FMCW lidar allows you to build more radar like perception model with minimal computation needed to track objects. Light IC is working with Mobis as a tier 1 partner. Super resolution (software defined) is used for better detection of stationary objects – and is easier to do than with ToF lidar. Speed bumps, potholes and other objects on the road can be mapped. Latency is low, moving objects can be detected in one frame and direction in two frames.

Panel – New Technologies

Light IC uses hybrid solid state and mechanical beam steer.

Heated dummy did not affect radar visibility

In heated environment there is still differences in emissivity, but there are more challenges. AI can be trained to improve performance for this

The lens will eventually be the biggest barrier to further reducing the cost of the IR camera.

The windshield manufacturers have solutions for IR transmissible areas to allow behind the windshield integration

Roof and in cabin are best solutions for lidar integration. Height reduction is key for this.

Ansys – Lionel Bennes, Lead PM

Simulation is needed to test systems due to short times and the amount of testing required. It's hard to repeat specific cases in the real-world. Software evolves quickly and requires rapid re-testing, perhaps nightly. Perception in the loop testing is required with physically accurate sensor models. Physics properties are required on top of 3D models. ADAS software can be run on actual HIL or on the local CPU (if the hardware is not ready yet). Matrix beam headlights can be simulated. Radar is hard to simulate IR cameras can be simulated – they have been working with Teledyne/Flir for a few years and can model their sensor. Lidar can also be simulated. Sensor correlation is to within 1% of physical sensors and reaction time within 3%. Other KPIs include false positives per 100Km , dynamic range of images and overall image travel time latency.

Burke Porter – Brunno Moretti, President ADAS Solutions

Post repair for ADAS systems is a key issue. Burke Porter is a major player in end-of-line equipment. Current AEB avoids 100% of collisions from 12-35 mph. At end of line, 100% of vehicles are calibrated when they leave the factory. Most body shops are independent and lack the awareness or equipment to

re-calibrate ADAS systems after collision repair. In testing there is large variance in stopping distances from non-calibrated vehicles – in fact in ACC testing it hit the target 100% of the times. Poor calibration AEB testing was also unpredictable. Even a relatively new car at 13K miles loses calibration through standard wear and tear. Calibration should be performed as a maintenance item. OEMs need to consider this.

Panel – Sensing Architecture and Validation

It will take an effort with OEMs, legislation, insurance and other education to properly equip the aftermarket with ADAS calibration systems.

Setting simulation KPIs for new technologies is a challenge. It will likely go through a few iterations.