Impression

NAIAS 2012: Cameras Gain Mass Market Momentum

by Jeremy Carlson

Following up on the preview of the North American International Auto Show, today let's take a closer look at the ADAS highlights from Detroit and trace one of the most evident and demonstrable show trends in recent memory: the proliferation of camera-based forward-sensing platforms.

Such camera sensor platforms have supported lane departure warnings since their introduction and are adding additional LDW-related functionality such as lane keeping assist.

In Detroit however several new platforms were announced or added to newly introduced models with one key additional feature: forward collision warning.

Forward Collision in Context

FCW applications in automotive have been nearly exclusive to radar sensors until now, with an occasional LIDAR-based system for a hint of sensor diversity. Radar was by far the dominant sensor technology supporting FCW and it was coupled with adaptive cruise control as both were very similar exercises in detection, sensing and ultimately control, regardless of the sensor used.

Radar sensors however, particularly of the 76-77 GHz variety used for such long range applications, were quite expensive - and still are today by comparison. In such a context, LIDAR had been positioned as the less expensive alternative and was seen on select Toyota and Chrysler models and Infiniti made the sensor and its ACC and FCW applications widely available; all the while, radar-based applications were common and growing across a range of BMW, Mercedes-Benz, Lexus, Jaguar and similar luxury brands.

While LIDAR was slowly phased out of use in long range applications within many OEMs, radar remained dominant but still limited in overall...
market penetration due to relatively high costs for the sensor and control systems. This was even more evident as nearly every system coupled ACC and FCW together, which was justified and even allowed mitigation and avoidance to be piled on to the alert-only FCW.

The utility of FCW, even without additional mitigation or avoidance applications, came under heavy discussion in recent months and years as potentially invaluable to all vehicles and drivers. FCW stands now as a part of the USA NCAP star ratings - though it has no effect on actual ratings and is only listed on the Monroney window sticker - and is ripe and ready to be included in actual NCAP star ratings in the near future as well as potential future mandates.

As a result of these discussions, many OEMs were and are looking at FCW as a possible must-have application. Unfortunately, the cost of radar has largely put that out of reach for most.

In the months leading up to NAIAS however, the first FCW application based on a camera sensor, and therefore decoupled from ACC and expensive sensor and control systems, was introduced quietly by General Motors on the Chevrolet Equinox and GMC Terrain. The calm before the wintry Detroit storm, if you will.

**Cadillac**

Detroit hosted one of the most vibrant auto shows in recent memory; every stand was bustling with activity and plenty of new models were unveiled at the 2012 NAIAS. Several OEMs took the opportunity to slide ADAS nearer the front of their portfolios too.

General Motors was the first to put a camera-based FCW system, coupled with LDW, onto the market and they didn't let off the gas in Detroit. The Buick Encore, slotted below the larger Enclave SUV, will offer the system at launch, but the more impressive story is from Cadillac.

At an event Sunday evening before the opening of the NAIAS, Cadillac unveiled the ATS. Cadillac hasn't exactly been on the bleeding edge of active safety in recent years but few expected that Cadillac, or the small sedan ATS, would bring so much ADAS to market.

The ATS will of course offer the camera-based FCW+LDW system, but there are several other options on the list. The most innovative option, and new to Cadillac and GM, has essentially installed a side object detection system in the front, as well as the one in the back for the side blind zone alert system. In total, the ATS can be equipped with two front and two rear 24 GHz UWB short range radar and a fifth long range radar sensor out front for ACC.

The system, simply named Front and Rear Automatic Brakes, is networked with front and rear ultrasonic sensors which together
monitor for objects and pedestrians. The system, as named, can autonomously actuate the brakes which can avoid collisions at speeds up to approximately 30 mph and contribute to mitigation at speeds above that. Those front SRR sensors are also employed by the ACC system, which adds full speed range capability to Cadillac’s ACC platform for the first time which again includes the second-generation HUD from the XTS.

As a result, the Cadillac ATS boasts a comprehensive safety bubble in all directions utilizing radar, camera and ultrasonic sensors. Active safety is in full effect on the ATS: long-range longitudinal braking via ACC, short range longitudinal braking in front and back, and lateral control via the LDW platform. All that’s missing is the active lane keep assist capability which no doubt will quickly be added to GM’s new camera platform.

**Ford**

GM certainly wasn’t the only one sharing a forward-sensing camera platform with new models. Ford introduced its internally-developed LDW+LKA system on the Focus in Europe last year, but the North American version is still curiously void of any ADAS beyond park assist. The Fusion changes Ford’s North American line-up.

The Fusion will offer the same LDW with active lane keep assistance that the European Focus brought to market and was announced in Los Angeles in November for the Lincoln MKS and MKT. There is one glaring difference between Ford’s forward camera platform and those others introduced in Detroit.

Ford’s LDW+LKA system, while offering an additional step up in functionality with active lane keeping, doesn’t support FCW applications currently. As is the case with most other OEMs, Ford does offer FCW with ACC, but that is an expensive proposition in nearly every circumstance relative to NCAP ratings or possible mandates.

It’s likely that Ford will add FCW to its camera platform, just as it is likely that GM adds LKA to its own. Ford opted to develop the LDW+LKA system internally however, which could mean additional development time to add the FCW application that other suppliers are ready to deploy on their own systems today.

**Honda**

An unlikely ADAS highlight from Detroit, Honda grabbed part of the spotlight with the Accord Coupe Concept. As is typical of Honda, it is using a very near-to-production concept to whet the appetite and gauge public perception of its forthcoming 2013 Accord. As such, fewer details were provided but some interesting news was confirmed.

Aside from its slightly more aggressive styling compared to its model
range mates, the Accord will bring more ADAS into American Honda Motor and into the Accord itself in North America. In preparation for news from NHTSA about FCW or simply as a means of offering a competitive ADAS portfolio in the USA, the 2013 Accord will bring Honda's own camera-based FCW+LDW system to America.

The Accord has offered LDW and ACC with Collision Mitigation Braking for several years in Japan and Europe, but it only offers Camera Park Assist in North America and that was only added recently as an option. In fact, the limited production FCX Clarity fuel cell vehicle is the only Honda model to offer ACC in the USA, which means the forward-camera LDW+FCW platform isn't the only system ripe for wider availability in North America.

The Accord is an ideal vehicle for Honda to launch these "new" ADAS platforms, with a reputation for reliability and significant market presence and penetration. Perhaps even the soon-to-be-refreshed Civic, with its popularity as well, would be a nice compliment to the Accord in sharing Honda’s new North American ADAS portfolio.

**Conclusion**

There was quite a lot of buzz on the show floor in Detroit, beyond the ATS, Fusion and Accord highlighted above. The BMW 3 Series was on display after its unveiling in mid-2011. It too will offer a camera-based FCW+LDW system along with the 1 Series, which explains as well as any words that these camera platforms are not simply a means to lower the cost and increase penetration of the utilitarian applications that they can enable.

It also reflects a changing reality in the ADAS space, forcing reconsideration of how and where various sensors can be positioned in a vehicle and across a model range. From that ADAS-centric perspective, Dodge - and certainly others as well - missed out a bit in Detroit.

The Dart is Dodge’s first worthy offering in the compact sedan segment, a very populated and competitive segment in most markets, in a long time. It would be an ideal slot to introduce lower-cost safety such as camera-based FCW+LDW, and in fact it does offer a relatively inexpensive SOD system.

Yet for everything it has and is expected to do for Dodge in a crowded segment, expanding its ADAS portfolio at a time when most competitive OEMs are doing the same was perhaps its one shortcoming. It's not the Dart's fault though: the high quality of the headliners in Detroit stole the show, and the Dart already has a tough task ahead of it.

If only it had a way to signal activity ahead...
CES: Ford Announces an Alliance to Monitor Drivers Health in the Vehicle
January 12, 2012 Read Online
Ford, Microsoft, Healthrageous and BlueMetal Architects announced an alliance yesterday at CES, to research technology that helps people monitor their health while in their car. As people spend more time on the road, the ability to manage health on the go becomes more important. The prototype system was designed by BlueMetal Architects. Using information collected from blood pressure and activity monitors, plus glucose meters along with behavioral data shared by the user, Microsoft's contributes by translating robotic sensory information provided by the vehicle into an app that also provides a voice and touch-screen interface, while integrating biometrical data that come from a wearable device. The driver can provide voice inputs, detailing important aspects of his or her health routine. The data received from the driver is then uploaded into the HealthVault cloud, and transferred to Windows Azure. The information is processed with other health data, and used to create graphical reports the driver can access after having left the vehicle.

NAIAS: Lexus Introduces the 2013 LX 570
January 11, 2012 Read Online
Lexus introduces The 2013 LX 570 at NAIAS with a number of upgrades. The instrument panel has been updated and a new color display is added. The LX 570 will offer again many ADAS features, including the optional Wide-view Front and Side Camera feature designed for use in tight settings like parking garages. Standard on the new LX 570 is a rear camera, HDD Nav and nine-speaker Lexus Premium audio with iPod/USB connectivity, HD radio with iTunes tagging, and HFP Bluetooth with A2DP, AVRCP and PBAP. The Lexus Navigation System includes Lexus Enform with Safety Connect and the next-gen Lexus Enform Application Suite that leverages the customers' mobile phone. Users can make searches through Bing, or utilize voice-enabled apps with OpenTable, MovieTickets.com, Pandora or iHeartRadio. Users will also have the ability to use Facebook, and search for various business reviews including restaurants on Yelp. The Luxury Package features a rear dual screen RSE system and an added electrical outlet. A 19-speaker Mark Levinson audio system is also available. No word yet on price or availability.

CES: Audi Releases More Details on Contact Analog Head-Up Display Technology
January 11, 2012 Read Online
Audi is extending its ADAS offerings and is showing a new contact analog head-up display (HUD) that was first showcased at last year's IAA. The HUD shows navi, traffic, car and assistance system functions. The information appears to hover about 2.3 meters in front of the driver, in the direct field of vision. With an active navi system, the driver sees a transparent route arrow outside of the vehicle,
positioned within or on top of the intersection. At a distance of 10 meters, it appears to be the same size as a physical arrow. In hilly terrain, the navi arrow can show the direction the road will take, while an active ACC system can display the distance to the vehicle ahead. An active night vision system detects pedestrians and shows the direction the pedestrian is coming from and distance to the car. In the future, the driver and front passenger will each have their own HUD; the driver's is contact-analog, while the passenger's is conventional. Visible to all occupants is a central third projection, which can be controlled by all with one hand movement that is detected by a camera.

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**NAIAS: Toyota Unveils NS4 PHV Concept with Next-Gen ADAS**

January 11, 2012 [Read Online](#)

Toyota has revealed its PHV concept called the NS4 at the 2012 NAIAS. The mid-size 4-door concept is designed for potential global market introduction by 2015 and features enhanced ADAS such as a next-gen Pre-Collision System (PCS), Blind Spot Monitor (BSM) with sub-millimeter wave radar, and three rear view cameras. The next-gen PCS utilizes a millimeter-wave radar and front stereo cameras to help avoid a collision. The system detects lane departures, pedestrians, and other vehicles, and assists the driver by applying the brakes and manipulating steering. The system also emits near-infrared beams for night-time recognition. The three rear view cameras replacing with inner and outer rear view mirrors provide the driver with a panoramic rearward view displayed on a dedicated dashboard mounted screen above the navigation screen. The rearward view also works with the BSM system to enhance driving visibility.

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**CES: Mobileye Introduces 5 Series with Bluetooth; Showcases the Smartphone App**

January 11, 2012 [Read Online](#)

The Mobileye 5-Series assists the driver, by identifying dangerous situations on the roads and providing audio-visual warnings to prevent or mitigate a collision. The Mobileye 5-Series features the following safety and convenience functions: It reads and displays traffic signs (Mobileye TSR), automatically turns high beams on or off (Mobileye IHC), activates lane departure warning (Mobileye LDW), forward collision warning (Mobileye FCW), headway monitoring (Mobileye HMW) and pedestrian collision warning (Mobileye PCW). Additionally, Mobileye's 5-Series is also enhanced with Bluetooth connectivity and can deliver safety warnings to a smartphone. The new 5 Series is shipping in two versions: at MSRP $749, the Mobileye 550 does not include a monitor screen (drivers could use phone's screen instead); the Mobileye 560, with monitor, is listed at MSRP $849. Currently, Mobileye supplies driver safety products to BMW, General Motors, Chrysler, Volvo, Hyundai and Ford.

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**CES: Johnson Controls Shows off 3D Display Technology with Multilayer ICD**
Johnson Controls showed off its instrument cluster concept at CES yesterday. It combines multiple layers of information to give a three-dimensional interface and creates a realistic view of the external environment for increased driving efficiency. The Multilayer Instrument Cluster concept uses thin-film transistor technology with high resolution, brightness and contrast, this creates a high-quality 3D interface that's easy to read. The multi-dimensional visual gives critical driver information, including speed, navigation and driver assistance systems information. It also prioritizes information based on driving conditions and can be layered to bring relevant data to the foreground and place less important information in the background. The concept also presents vehicle information in front of the driver as opposed to requiring the driver to look elsewhere on the vehicle dashboard. When used with a crash avoidance or driver assistance system, the Multilayer Instrument Cluster offers a graphic to show decreasing distance to an exit or the distance to the vehicle ahead.

NAIAS: Ford Details the New Tech on 2013 MKS and MKT; Showcases the MKZ Concept
January 10, 2012 Read Online
New features found on the 2013 Lincoln MKS and MKT include expanded Sync functionality now includes standard Operator Assist and local Wi-Fi hotspot capabilities for laptops and tablets. ADAS features include Collision warning, new Lane Keeping Alert and new Lane Keeping Aid technologies to help warn drivers of potentially dangerous situations and can help them avoid common accidents. The Lincoln MKZ Concept's four-seat interior includes a reconfigurable 10.1-inch Thin Film Transistor LCD positioned ahead of the driver that operates with the latest version of MyLincoln Touch as does the center 8.0-inch LCD touch screen. Additional details and pricing will be announced closer to launch date.

NAIAS: Harman Demonstrates HMI Concept with Gesture Recognition
January 10, 2012 Read Online
Harman featured an innovative HMI concept at NAIAS in Detroit this week, including a six-axis rotary control, multi-touch display and infrared proximity and gesture sensor enabling access to content explaining applications in research. Dynamic range calculations utilizing road attributes and fuel estimations were laid out on a large instrument cluster display. A base view showed a zoomed out 3D map and range halo, which zooms in at complex traffic situations with augmented reality overlays signaling correct turns as well as blocking out Do Not Enters and wrong turns. A hybrid view for urban driving showed the foreground and the next several blocks in a 3D view with building models, while everything ahead of that threshold was folded up onto a vertical wall displaying a 2D map, combining useful near-term navigation without sacrificing visibility ahead on the horizon. Lastly, using current production sensors, a Top-Down Park Assist system included a birds-eye camera view able to float around the vehicle enabling additional perspectives for particular maneuvers with ultrasonic overlays.
CES: Kia Showcases Naimo EV Concept with 12.3-inch Touchscreen Incorporating ADAS
January 10, 2012 Read Online
Kia Motors is displaying its Ray EV and Naimo EV concept for the first time in North America at CES. The Naimo introduces an all-new User Centered Driving (UCD) concept which features a digital heads-up display (HUD) that replaces the traditional gauge cluster for information including speed, distance and battery life. The display also incorporates navigation directions or downloadable applications for parking. To improve screen visibility and accessibility, the UCD concept increases the center stack touchscreen to 12.3-inches with a resolution of 1280x480 and allows for multi-touch interactions. The UCD concept also integrates an infra-red LED and camera to monitor the driver's face, detecting changes in eye movement, and Color Night Vision - which identifies potential hazards by combining two infra-red cameras, an infra-red lamp and a processor. The integrated processor is able to distinguish pedestrians in the camera's field of view and highlights them on the 12.3-inch display and triggers a warning sound to alert the driver.

NAIAS: 2013 Honda Accord Brings New ADAS to American Honda Motor
January 10, 2012 Read Online
Honda unveiled the Accord Coupe Concept in Detroit today, previewing the ninth-generation of the popular model coming to market later this year as a 2013 model. The Accord will also bring several new ADAS applications to market including a camera-based LDW+FCW system that has quickly become a new feature for many OEMs ahead of anticipated regulation in the USA; the forward-sensing digital camera platform will come to all models over several years. The Accord will also be the first to offer LaneWatch, a camera mounted in the passenger side mirror and to monitor the blind spot at speed and likely low-speed visibility assistance as well. The passenger side feature will be complimented by the Expanded View driver's mirror launched recently on the new CR-V, expanding visibility by 7 degrees through a convex mirror extension. The Accord will offer the Multi-Angle camera park assist also launched on the CR-V. The Accord, like many competitive models, looks to bring new safety systems down market and to a new segment of drivers with most technologies to be shared across the model range.

CES: Alpine Introduces the VPX-B104R Visual Parking Assist Sensor System
January 10, 2012 Read Online
According to CEoutlook, Sony continues to stress the Driver Safety category with two new backup systems, including its first parking assist system, the VPX-B104R VPASS (Visual Parking Assist Sensor System). It is designed to help when backing into parking spots by giving audible and visual warnings for objects behind or next to the car. When looking at the in-car screen, users see the parking space lines overlaid by a grid showing the distance between the car and objects around it. It can also be used with a new
back up camera model HCE-C104 that switches automatically from normal to ground view when users are within a foot of an object behind the vehicle. The price for both devices as a bundle is $349 and they are also sold separately at prices to be announced. The VPASS parking device will be available in April and the backup camera is available in January.

**NAIAS: Buick Encore the Latest GM Model Offering Camera LDW+FCW**

January 10, 2012 [Read Online]

Buick unveiled the Encore in Detroit today and outlined a brief but intentional list of ADAS features coming on the compact SUV. The Encore will offer Camera and Ultrasonic Park Assist as optional equipment as well as the optional camera-based Lane Departure + Forward Collision Warning system recently deployed on the Chevrolet Equinox and GMC Terrain. With the recent addition of the Cadillac ATS, GM has quickly doubled the system’s availability by model with plans to continue the expansion as more models are updated and anticipated regulation looms on the horizon. The Encore is aimed at markets in North America and China in particular, looking to capture part of the compact SUV segment that General Motors expects will double in size by 2015 as fuel efficiency regulations set in and more buyers move towards compact vehicles that are more suitable in urban environments while not sacrificing the utility common to the SUV segment.

**NAIAS: ATS Introduces Several ADAS Apps to the Cadillac Brand**

January 10, 2012 [Read Online]

Cadillac introduced the ATS in Detroit Sunday evening and outlined an impressive collection of ADAS on the small luxury model. The camera-based LDW+FCW system introduced on the Chevrolet Equinox, GMC Terrain and most recently the Buick Encore will be optional on the second of four trims and standard on the third and fourth. This makes the feature much more widely available, as the Equinox and Terrain offer it as optional on the highest trim level. Optional on the top two trims will be an ADAS package including SOD, radar ACC with Full Speed Range supported by two front 24 GHz UWB radar sensors, Front and Rear Automatic Brake utilizing the 24 GHz radar and ultrasonic sensors with avoidance from ~30 mph and mitigation above that speed, and second-generation HUD first seen on the XTS. In total, the ATS would feature five radar sensors including one forward long range and one short range in each corner, a scalable forward camera platform and rear camera park assist as well as several front and rear ultrasonic sensors, completing an impressive collection of sensors and ADAS applications.

**CES: iOnRoad Offers ADAS App for Smartphones**

January 10, 2012 [Read Online]

Picitup announced new additions to its ADAS app named iOnRoad. The app utilizes the
camera found in the smartphone for its algorithms to then create a modified version of forward collision warning. Lane Departure Warning is also now available via the app. The user's smartphone clips into a windshield mount and then accesses the phone's camera to warn drivers if they are getting too close to approaching vehicles. It now also does the same thing if the driver wanders into neighboring lanes. The app also reads aloud any incoming text messages, and switches the phone to speakerphone for any incoming phone calls. iOnRoad can be found on both the Apple and Android app stores for download.

2013 Toyota Land Cruiser Receives Standard HDD Navi with Entune
January 06, 2012 Read Online
Celebrating its 60th anniversary, the 2013 Toyota Land Cruiser will get some refreshed features including many standard technologies. In fact, there are no options on the Land Cruiser - everything listed comes standard. This includes technologies like HDD-based Navigation with 8.0-inch high resolution touch screen display and Entune, a Rear Seat DVD Entertainment, JBL Synthesis Premium Audio system with 14 speakers, and Dynamic Radar Cruise Control with the Pre-Collision System. Other standard features include Bluetooth with voice recognition, hands-free phone, and streaming audio, HID low-beams, a TFT-LCD instrument cluster display, Safety Connect telematics with Stolen Vehicle Location, ACN, eCall, and Roadside Assistance, a rear camera and front and rear ultrasonic park assist sensors. Images also show a front camera sensor that will likely provide lateral visibility when exiting a blind driveway. Pricing has not yet been announced.

TRW Wins Commercial Vehicle Camera Contract in Advance of European Mandate
January 05, 2012 Read Online
TRW Automotive has been awarded its first commercial truck camera contract to support EU-mandated lane departure warning and automatic emergency braking. TRW will begin to supply the system in late 2012, which will enable several applications including lane departure warning, object recognition, forward collision warning, traffic sign recognition and headlight control. TRW notes that the camera, when combined with a radar sensor, can support other functions such as automatic emergency braking. The European Union mandate calls for the installation of lane departure warning systems and automatic emergency braking for new heavy truck model launches sold in Europe from late 2013 and for all new trucks in Europe from late 2015. Similar technologies have been considered for inclusion in passenger vehicles as well, with the USA NCAP rating adding LDW, FCW and ESC to its watch list and Europe exploring the addition of LDW and other applications to its Euro NCAP tests.

Renault Adds Camera LDW to High-Volume Megane
January 05, 2012 Read Online
Renault has updated the Megane for 2012 and added a new ADAS option. First introduced on the Scenic and Grand Scenic for 2012 late last year, the Megane will offer the Visio System featuring a windshield-mounted camera sensor by Kostal that will support automatic high beam activation and lane departure warning. The camera sensor detects the lack of natural or street lighting and the presence of other vehicles and activates the main beams to automatically increase visibility for the driver at speeds above 45 kph. Lane departures warnings are audible and visual when the system detects a lane exit without the use of the indicators. The addition of the system is noteworthy for Renault, as the brand has not aggressively pursued the deployment of advanced driver assist systems while the Megane is a model with a high volume of sales with 235,000 sales worldwide in 2011.

Fuji Heavy Industry Announces EyeSight Attach Rate on New Impreza

January 05, 2012 Read Online

Fuji Heavy Industry (FHI) has shared sales numbers of the new Impreza for the first month since the new model was announced in November 2011. FHI received a total of 7,157 unit orders, which is more than three times its targeted sales for a month. The new Impreza features Subaru's EyeSight technology for the first time and the attach rate for the second generation EyeSight is 44.4% of the total orders, according to FHI. The EyeSight is offered on the 2.0i and 2.0i-S trims for JPY100,000 and the attach rate on these trims is 84.9%. The second generation EyeSight is also offered on the Legacy.