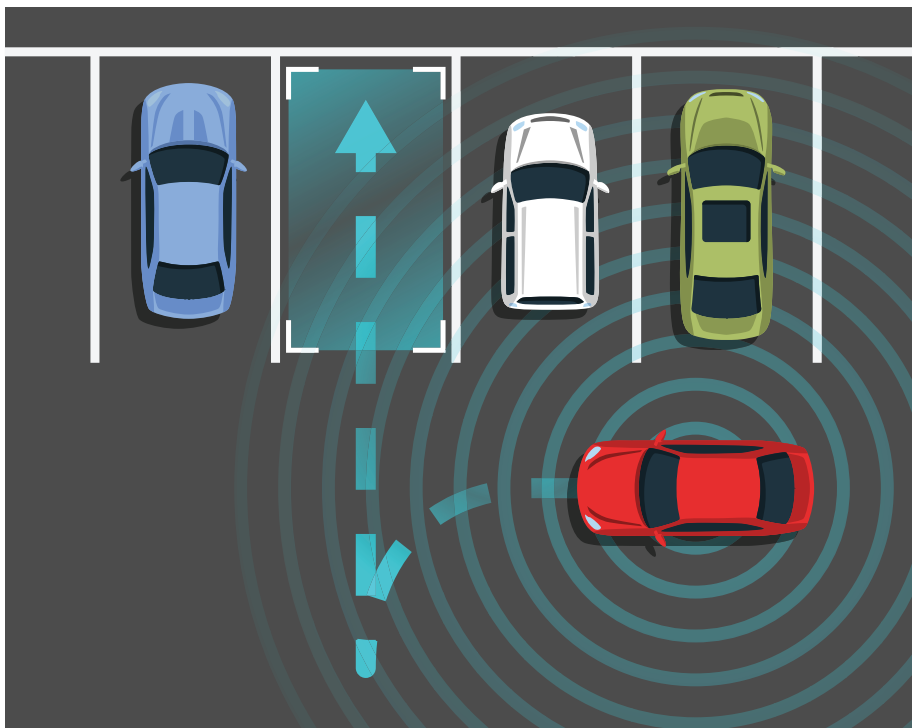


ADAS Q&A WITH JOHN WARANIAK

Grasping the Basics of Parking-Assistance Systems

By Mike Imlay



■ Passive parking-assistance systems currently comprise the most prevalent category of new ADAS technologies rapidly transforming the aftermarket. They promise a new level of safety performance and convenience for consumers.

While identifying multiple growth opportunities for the specialty-equipment industry, the recently released “SEMA Advanced Vehicle Technology Opportunities Report” (see p. 106) predicts specific growth potential in the area of parking-assistance systems. To better understand this advanced driver assistance systems (ADAS) technology, *SEMA News* turned to SEMA Vice President of Vehicle Technology John Waraniak.

SEMA News: *Let’s begin with a basic overview of the parking-assistance systems (PAS) category. What technologies are involved?*

John Waraniak: PAS technologies allow drivers to park under circumstances that may be difficult for less-experienced drivers or drivers in high-traffic and close-quar-

ters environments. The systems include both passive and active technologies that improve driver awareness of surroundings at low speeds. Passive PAS alerts the driver of the vehicle’s distance to objects while parking but doesn’t engage vehicle control systems. Active PAS technologies are currently available as automated and fully autonomous systems. Active PAS is not

intended as a safety benefit but as a driver convenience.

SN: *Since active PAS is more complex, can you break it down first for us?*

JW: Automated parking technologies engage the steering system of a vehicle to help the driver park, but they still require driver monitoring. The systems are integrated into steering controls to guide vehicles into parking spots. However, the systems still require drivers to apply brakes and acceleration throughout the process. Active parking steering assistance is an SAE Level 1 automation system.

Autonomous and self-parking technologies take complete control of the vehicle’s steering to move a car from a traffic lane into a parking spot. Active automated parking, specifically, is an SAE Level 2 driving automation system that allows a car to automatically enter or exit a parking space without the driver exercising direct physical control over either the powertrain, steering or brakes. The feature can be initiated with the driver inside or outside of the vehicle. If the driver is outside, he or she typically operates the system via a smartphone app or a remote key and is responsible for overseeing its operation.

SN: *And next we have passive PAS?*

JW: Yes, and those technologies include backup or 360-degree cameras along with electromagnetic or ultrasonic sensors to warn or assist a driver while parking. A rear cross-traffic alert is an added function in some of the systems. Systems with 360-degree vision use four or more wide-angle cameras combined with image processing software to generate a bird’s-eye

view of the parking space. Passive PAS technologies are widely available today in the aftermarket in three basic forms.

First is distance alert, most types of which use ultrasonic sensors in the rear bumper to measure the distance between the bumper and an obstacle. The distance is usually relayed to the driver via audible feedback—a series of beeps that increase in frequency as distance to an object decreases. Ultrasonic systems can also be a low-cost augmentation to other PAS features. That warning technology could be extended to provide an intervention system—a “virtual bumper” to actively prevent low-speed impacts.

Next, backup-camera systems consist of a rear-facing camera and an in-vehicle display. There are a variety of ways to install and utilize aftermarket rearview cameras, including phone displays, secondary screens, dashboard integration, etc.

Finally, rear cross-traffic alert systems use sensors and radars to measure and interpret the distance, speed and anticipated driving path of vehicles detected in cross traffic when a vehicle is in reverse. The driver is warned of potential collisions via a driver interface—typically an audible warning, but there are also visual and haptic versions.

PAS AND ADAS REPRESENT NEW BUSINESS AND PRODUCT OPPORTUNITIES FOR SEMA MEMBERS. —JOHN WARANIAK

SN: *What are the biggest opportunities for aftermarket manufacturers, installers and retailers?*

JW: As with other active ADAS systems, active PAS requires integration with vehicle control systems, which is a time-consuming, complex and costly process. However, integration of passive aftermarket PAS features and products is relatively simple and has the highest aftermarket adoption rate of all ADAS systems.

The opportunity for the aftermarket is in providing innovative PAS features that are cost effective, attractive and inte-



■ SEMA members are already at work bringing new products to the highly competitive PAS category. Recently, Voxx Electronics introduced LOOK-IT, a DIY, wireless, license-plate-mounted backup camera that displays images with virtual guidelines on a user's smartphone.

grated with other vehicle personalization features, such as license-plate holders, tailgates, grilles, mirrors, lights and lightbars. Off-road enthusiasts may also be interested in the ability to switch between onboard camera views showing the clearance under the vehicle or a view of where each specific tire is planted.

Improving technologies, decreasing hardware costs and increasing consumer

professional or do-it-yourself installation. More than 4.5 million units are sold annually, representing about \$700 million in sales. That market is expected to grow to a \$1 billion market by 2021.

Long-term growth potential for aftermarket rearview cameras will be limited with new vehicles, since they were mandated as OEM standard equipment by the National Highway Traffic Safety Administration (NHTSA) with FMVSS No. 111 in May 2018. However, the opportunity to upgrade and retrofit older vehicles with rearview cameras is still significant. That segment will likely remain at more than 4 million units for the next 10 years, according to our SEMA Advanced Vehicle Technology Research Study.

Higher profit margins and new-product and business-development opportunities are possible with 360-vision systems and products customized to niche markets such as off-road and towing vehicles. Other aftermarket opportunities may include the ability to switch between even more vehicle-mounted camera views. Honda recently integrated a screen that shows a backseat view to the driver in the Odyssey minivan.

SN: *What about the supplier landscape for those products? PAS appears to be a more competitive niche than other ADAS categories. Do you see room for further growth and/or new players?*

interest will continue to drive new business opportunities. The value-add for SEMA members would be in cool, innovative applications and integration of hardware with the vehicle and an intuitive, customized and useful driver interface.

SN: *With passive systems so widespread, what trends are we seeing in the market today?*

JW: There is already a very strong aftermarket segment for passive PAS systems, mostly in the form of rearview cameras. Backup cameras are readily available for

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JW: The supplier landscape for passive PAS is highly fragmented due to its prevalence, ease of installation and integration, as well as the declining costs of the component technologies. A variety of different aftermarket suppliers can compete in the market by offering varying price points and customized and personalized PAS products and applications.

Backup cameras and parking sensors showed the greatest penetration of the U.S. fleet in the Highway Loss Data Institute's projections for 2016. Nearly 25% of all vehicles had backup cameras, and that number is expected to grow to more than half of the fleet in 2021. Rear parking sensors had diffused to an estimated 17% of the fleet in 2016. They were projected to reach 39% penetration by 2021 and to reach 50% in 2025.

New PAS growth opportunities for SEMA members are also being created with aftermarket accessories that integrate with vehicle trailer hitches—think bikes and gear racks. Those accessories may interfere with factory-installed ADAS and PAS sensors and cameras. But new players and collaborations with leaders such as Yakima and its vehicle racks for bikes, gear and cargo will develop innovative products and solutions that integrate with factory-installed or aftermarket ADAS and PAS technologies as well as bring them to market more quickly and efficiently to drive aftermarket sales and new growth opportunities.

SN: *Which brings us to future trends. What do you foresee?*

JW: NHTSA estimates that 25% of all parking-lot accidents are caused by vehicles backing up into another vehicle and estimates that a 46% reduction in accidents while backing up can be expected if all vehicles are equipped with backup cameras. Although those first-generation systems and technologies are rather basic, the technology, hardware and software integration will continue to improve and evolve with smarter and more connected products to detect vehicles as well as pedestrians, bicyclists and motorcycles.

Autonomous valet parking systems will certainly be part of the driving experience in five to 10 years. The only known auton-



■ Aftermarket companies offer a variety of display solutions for PAS and backup cameras, including replacement-kit mirrors like the Metra Electronics iBeam with integrated 4.5-in. LCD screen. Two video inputs allow for rearview and secondary video feeds.

omous valet system I am aware of today is Tesla's "Summon" function of its embedded autopilot software package. Automated valet parking systems are an SAE Level 4 driving and parking technology capable of operating without direct human control or monitoring. That could be achieved by programming specific routes for a vehicle owner who would like the ability to exit the car and then have it autonomously drive and park itself in another location as well as retrieve itself.

SN: *Do you have any parting advice on PAS for SEMA members?*

JW: PAS and ADAS represent new business and product opportunities for SEMA members. However, vehicles equipped with the latest ADAS technologies pose challenges for aftermarket companies seeking to modify and accessorize them. As the complexity of automated driving functions, products and systems increases, so too does the cost and complexity of testing and validation.

PAS and ADAS sensors, cameras, radars and software are often integrated in the parts and systems that SEMA companies are customizing or replacing. Most PAS and ADAS technologies are not yet regulated and need to be addressed today with new procedures for recalibration and functional compliance testing, system evaluation and full-vehicle scanning software tools.

Although passive PAS are simpler than active systems, SEMA members modifying PAS-equipped vehicles need to pay

attention to the functional operation of the rearview cameras and sensors. One example is Jeep's new ParkSense rear parking assist system.

Larger wheels and tires may cause warning lights and throw diagnostic trouble codes. In that case, the sensors and cameras may need to be recalibrated or relocated to ensure the functional operation and compliance of the PAS. On some vehicles the PAS sensors and software are smart enough to recalibrate themselves, but functional operation and system capability may be reduced.

The automakers have guidelines and best practices available to dealers and collision-repair shops to help ensure that ADAS technologies are recalibrated and function as intended after a vehicle has been repaired. If SEMA members are not using those tools and checking the OEM information database, they may be missing an important step in customer satisfaction and the customization process of late-model vehicles with PAS.

SEMA's vehicle technology department is working with the Society of Collision Repair Specialists and I-CAR to help connect members to those tools and procedures and integrate them with SEMA Garage measuring sessions and the Tech Transfer program. ADAS sensor location, calibration tools, resources, procedures and costs will be addressed in an upcoming article focused on sensor recalibration and included in the SEMA Vehicle Technology ADAS Resource Guide: www.semagarage.com/services/vehicleadas. ■