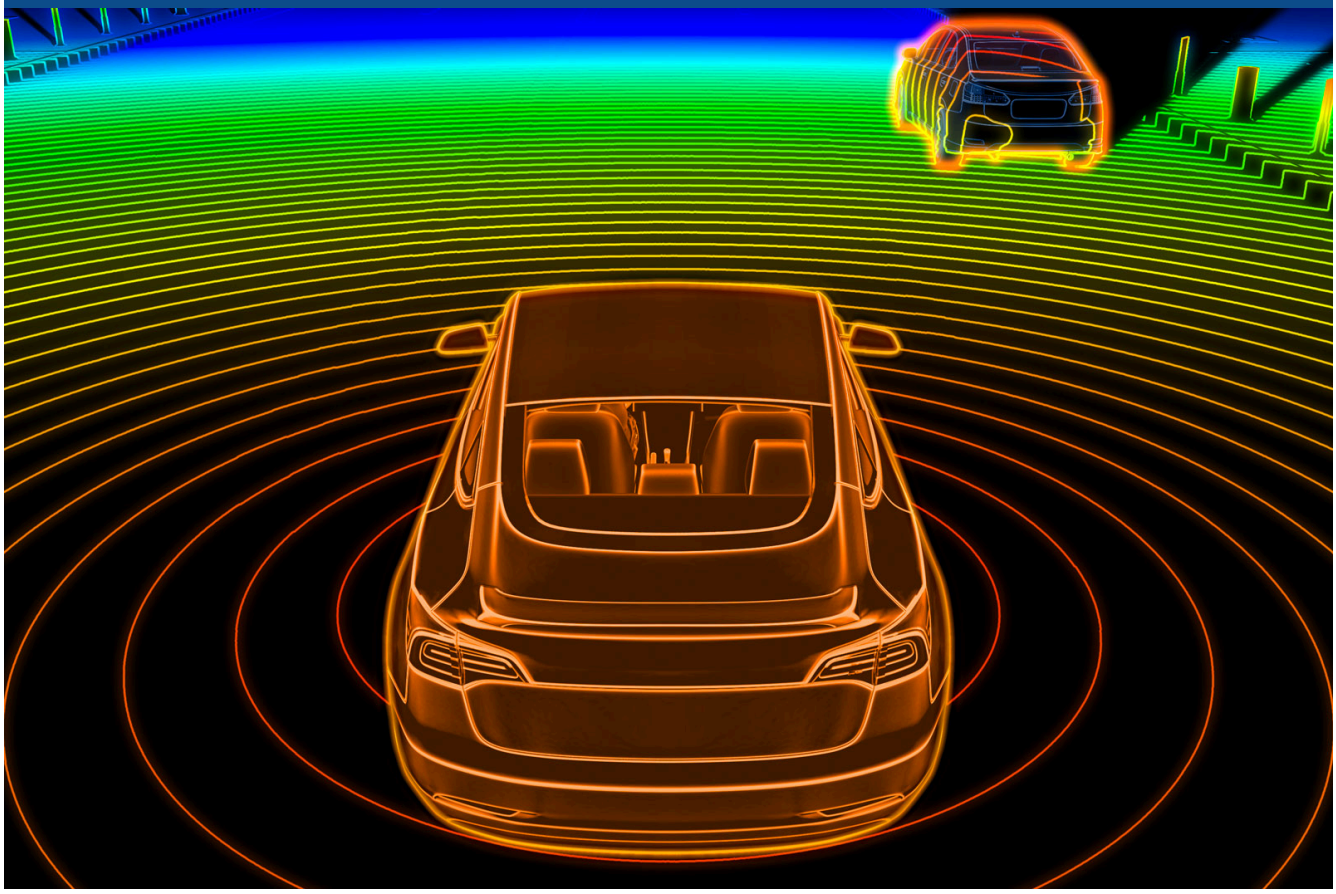
DVN

Sensing & Applications

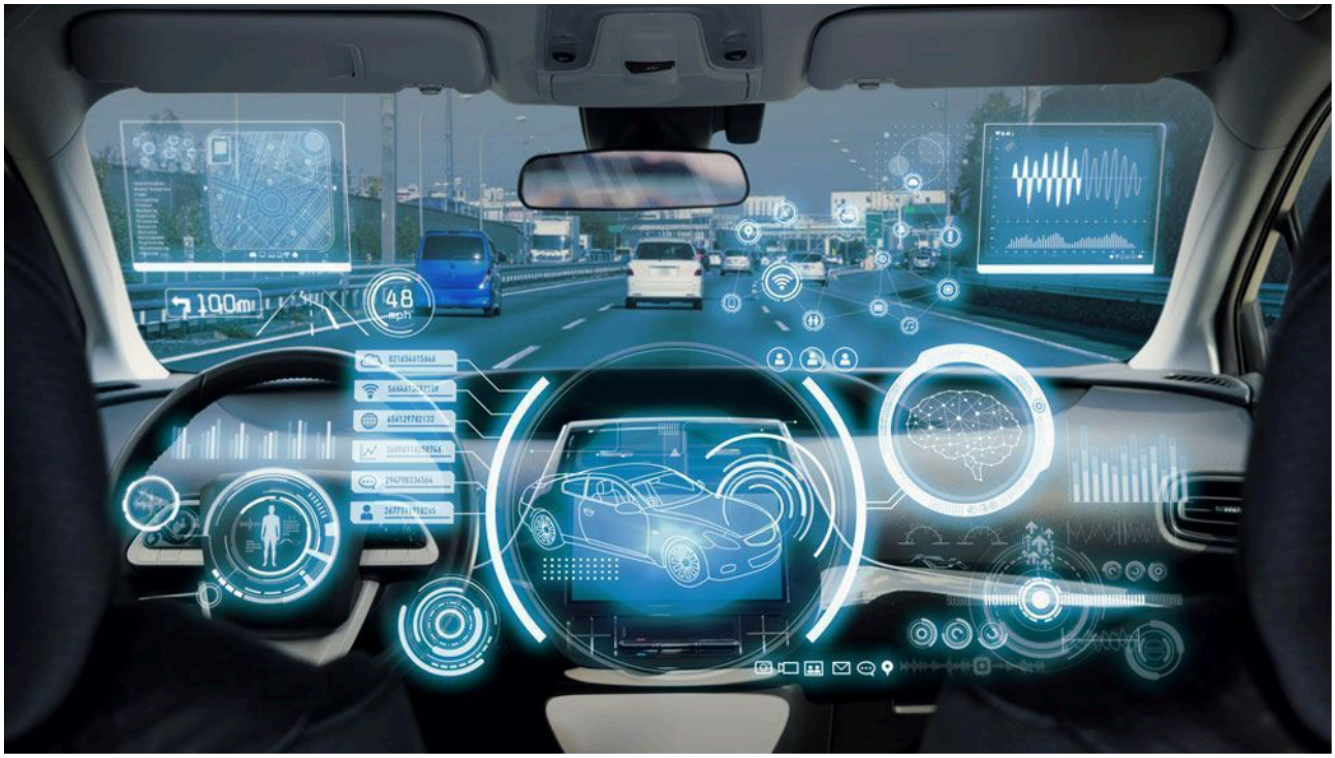
Monthly newsletter #2

JANUARY 15, 2025



EDITORIAL

Introduction to the DVN ADAS/AD Applications Newsletter



Welcome to the first DVN ADAS newsletter. As DVN expands coverage beyond LiDAR to cover more topics in the ADAS space this monthly newsletter will will cover ADAS news and interviews for ADAS features and applications, compute, integration and software.

Level 2 ADAS becoming an option in many cars in EU and US – Ford for example offers a $995 tech pack with Co-Pilot360™ Assist+ on the lowest price Escape Active™ model that includes adaptive cruise control, lane centering assist and stop-and-go driving. On a VW Golf Match in the UK, a driver assistance package with lane keeping assist can be added for £695.

Penetration in China for Navigate on Autopilot (NOA) already exceeds 20% and self-parking and other features are coming to more and more new models.

The new NHTSA FMVSS 127 AEB standard will also likely require updated hardware to achieve nighttime PAEB performance. We have published a separate white paper on that topics and will host a workshop in April to discuss the new AEB technologies in more detail.

We hope you will find this expanded coverage useful and if there are other teams in your company that can benefit from the increased scope of the DVN Sensors and Application service, please have them contact us at mbooth@drivingvisionnews.com

We have a number of key events planned for 2025:

- AEB Workshop (US): sensing solutions for FMVSS 127 in Detroit, 9-10 April
- Lidar Tech Expo (China): co-hosted by DVN and EAC in Hangzhou, 4-6 June
- DVN Sensing Conference (Europe): NOA & Lidar in Wiesbaden, 17-18 November

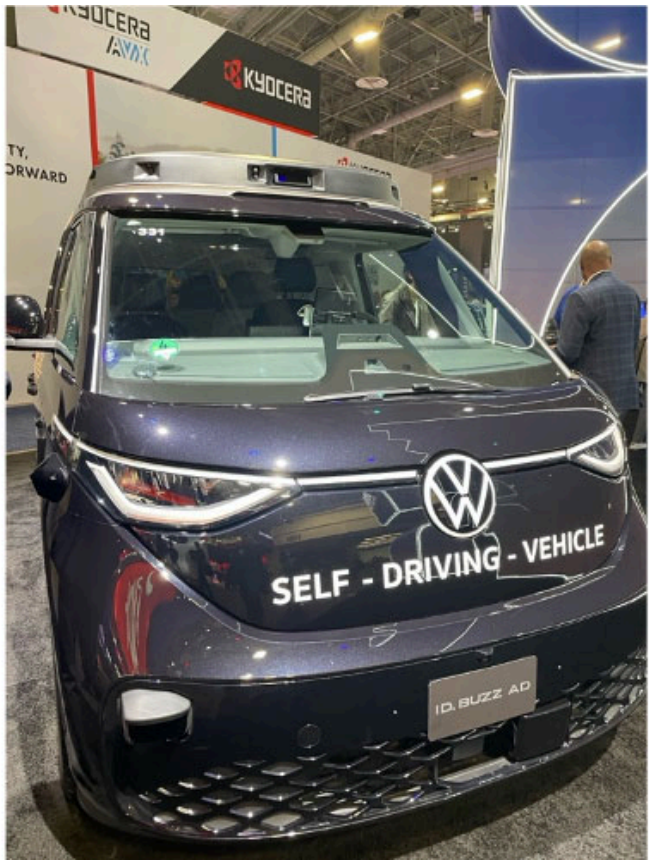
Thank you,

Martin Booth

DVN USA Representative

INTERVIEW

Interview with Mobileye on Next Generation AEB



Mobileye Subject Matter Expert: Shimon Solodkin, Director of Product for AEB & Lighting Applications

1. DVN: Can current RCCB cameras meet the specs for the NHTSA FMVSS 127 AEB regulation? Is SWIR an option – and will quantum dot allow them to reach a reasonable cost? Can a single (Forward) camera be used for level 2 and meet nighttime AEB specs or do we need a separate solution for this.

   Mobileye's current generation of camera-based systems demonstrate strong performance in nighttime AEB scenarios, including with only a single front-facing camera. For FMVSS 127, achieving compliance largely depends on the overall system design, including headlamp optimization on the OEM side. Our current assumption is that a single camera shows very good performance against FMVSS performance metrics. Mobileye's camera-based solution leverages advanced image processing and AI algorithms to achieve high accuracy for pedestrian and vehicle detection, even in challenging low-light conditions, without requiring additional sensors. Additional sensors beyond cameras would add cost and complexity barriers that could limit widespread adoption.

2. DVN: Are LWIR Thermal cameras a better solution and why/why not ? Can they achieve the costs required ?

Mobileye believes that optimizing the capabilities of forward-facing cameras combined with robust AI processing offers a more cost-effective and scalable solution for meeting regulatory requirements.

3. DVN: Is HD Radar an alternative option for this application, and what are the pros and cons versus LWIR ?

   Radar's resolution for detecting smaller objects or differentiating pedestrians from other obstacles is less precise than camera-based systems on their own. Mobileye integrates radar with cameras in some configurations to enhance redundancy and performance, especially for higher levels of autonomy.

4. DVN: LiDAR is still expensive – US/EU vendors might approach $500 in this timeframe and China vendors might be half of that – how does HD Radar compare to LiDAR in this timeframe ?

   The imaging radar solution Mobileye is preparing to bring to market demonstrates the potential to reduce the need for surround Lidar in advanced systems, offering cost advantages to OEMs without sacrificing performance. However, we believe Mobileye's camera-based solutions will be capable of meeting regulatory requirements without the need for the added cost and complexity of imaging radar or lidar. Imaging radar and lidar become more relevant as automakers deploy more advanced automated systems, such as eyes-off highway driving.

5. DVN: The AEB solution requires more than just the sensor of course – is the AI Component of the solution best in the camera/radar module ? What sort of processing is needed to achieve this (TOPS ?). Is a specialized ISP required ?

   AI models for driver assistance applications are most efficiently deployed on purpose-built hardware optimized for AI-specific workloads. Mobileye's EyeQ family of SoCs are designed from the ground up to deliver high-performance, low-power processing tailored for ADAS and autonomous capabilities. Our processors can handle the demands of multi-sensor fusion, including both cameras and radar, with enough computational power to enable real-time object detection and classification.

   As an example for AI integration, the EyeQ6L harnesses a deep learning dynamic neural network (DNN). When combining the additional computational resources EyeQ6L offers with new AI integrations, this unlocks powerful capabilities, like Neural Network Semantic Segmentation (NSS), our pixel segmentation DNN, and pairs it with advanced classifiers, which enables "pathways." Pathways are in reference to a novel algorithm that introduces center paths for all lanes in the image simultaneously. There are also multiple new sensing products, such as advanced, any-object detection and enriched semantic information of VRUs (vulnerable road users) and vehicles alike.

6. DVN: Will most vehicles have other L2+ functions in this timeframe. Assuming that is the case, what is the optimal sensor set for L2+ including AEB? Is there much cost savings to only meet the NHSTA requirement and will base models just have this? Is the Mobileye system in this timeframe scalable, i.e. you can have low-cost base configuration, but same platform (with additional sensors for example) allows an upgraded L2+/L3 solution also?

   By 2027, we anticipate L2+ capabilities, such as eyes-on, hands-off highway autopilot, will be offered as a premium option by most global automakers. Mobileye's scalable architecture supports both cost-effective base configurations and enhanced systems with additional sensors for L2+/L3 functionality. For these requirements, our Surround ADAS solution, using front, rear and parking cameras linked through a single EyeQ6H, provides robust safety and driver-assist features with a simpler sensor configuration and lighter compute, making it a

cost-effective option for mass market vehicles. At the premium end, Mobileye SuperVision™ delivers robust, hands-free L2+ functionality in defined domains through 11 cameras for 360-degree coverage, as well as an HD Map and Mobileye's RSS driving policy model, using two EyeQ6H – building on the economies of scale enabled through Surround ADAS.

7. DVN: Is there a relation given how camera detection of objects differs from human perception ?

   "Perception" is the key term – humans perceive objects, the environment and key driving tasks in many ways that surpass even the most advanced camera systems. However, cameras have the advantage of never being distracted or fatigued from sensing what's around the vehicle. Our long history with camera-based safety systems proves that technology working together with humans saves lives and reduces crashes.

8. DVN: Are there requirements on low beam performance for good AEB performance ?

   Yes, there are minimum requirements already defined in headlamp regulations. Mobileye works with OEMs to align headlamp design and sensor performance to meet these standards effectively.

9. DVN: What would be the optimum low beam performance be for such situations ?

   FMVSS No. 108 defines the maximum allowable illumination for low beam performance, which serves as a key benchmark for AEB nighttime performance. Mobileye is actively collaborating with OEMs to strike the right balance between optimizing illumination for sensor performance and ensuring compliance with FMVSS 108 regulation.

10. DVN: Even the best camera system needs some time to arrive in its process by then detecting an object. What is the time span for object detection (worst case – average – best case) ? (Because the delta between elapsed time until detection/reaction and the remaining distance means remaining braking distance)

    Our front-camera system is capable of detecting objects at ranges of hundreds of meters during daytime conditions. In low-illumination scenarios, such as those specified under FMVSS 127, detection range is more constrained due to the more limited visibility provided by low beams. However, the nighttime breaking scenarios outlined do not require extremely long detection distances for AEB to be effective. Detecting an object as close as 40 meters is sufficient to ensure safe braking under such conditions.

11. DVN: How strong do you think is the impact of the low beam for the far- distance pedestrian object detection under streetlights in NCAP testing?

    Detection with low beams under street lighting has been a standard part of NCAP testing for several years. We don't see this as a significant challenge, as current systems on the market have consistently demonstrated strong performance at speeds up to 60 kph as required by NCAP. We work frequently with automakers to ensure low-beam headlights provide enough light for robust camera sensing in these situations at a variety of speeds.

SPECIAL REPORT

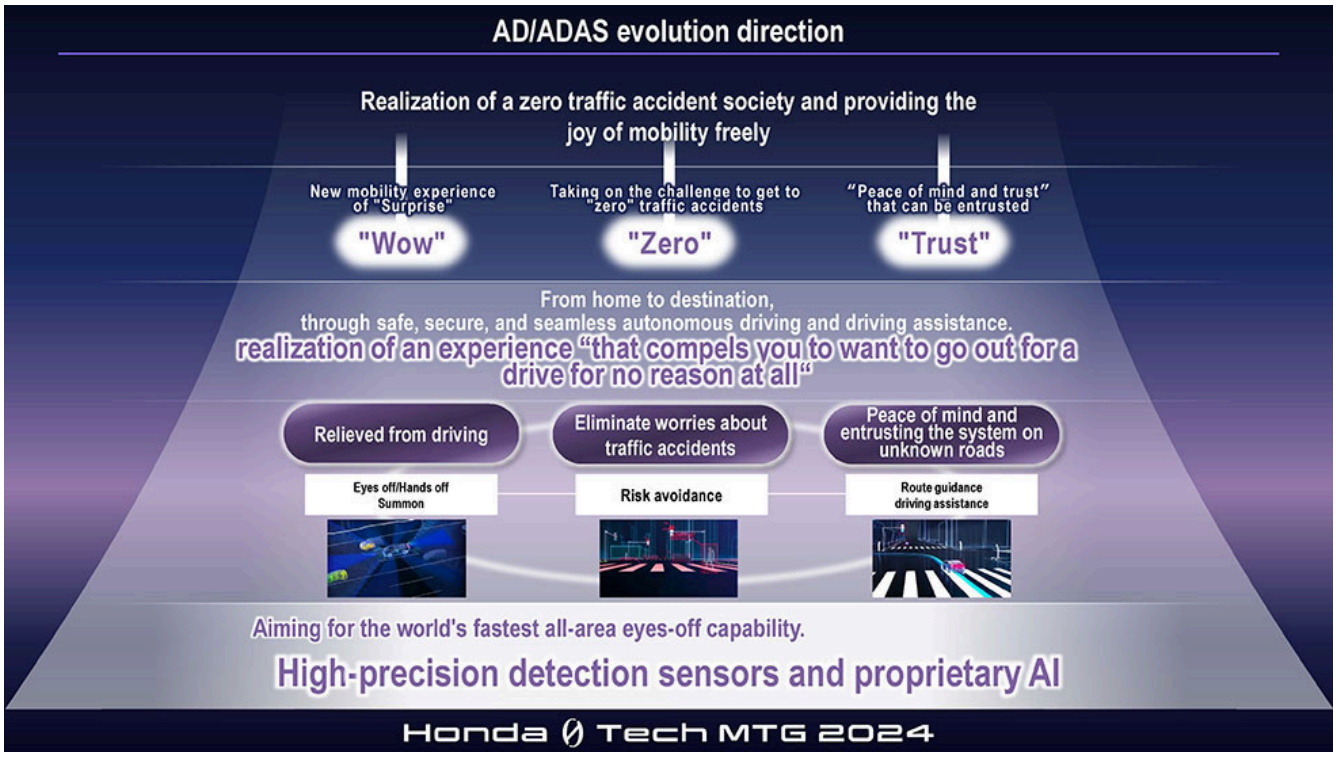
Special Report: HONDA - AD/ADAS (Automated Driving/Advanced Driver Assistance Systems) - Oct 9, 2024

Honda is developing its AD/ADAS with an aim to offer “experiences that make people want to go out more spontaneously” by supporting safe and seamless mobility which people can enjoy with peace of mind, not only while driving but for the entire way from home to their destination.

In 2021, Honda put Level 3 automated driving equipment into practical use with the launch of the all-new Legend equipped with Honda SENSING Elite, which qualified for Level 3 automated driving (eyes-off), conditional driving automation in limited areas. The Honda 0 Series models will feature AD/ADAS technologies that utilize the Level 3 technologies to offer more affordable automated driving vehicles to more customers. Moreover, Honda 0 Series models will be equipped with a system that enables the expansion of the range of driving conditions where driver assistance and Level 3 automated driving (eyes-off) will be available. This expansion will start with eyes-off technology available in traffic congestion on highways, then will continue through the OTA updates of the functions. Honda is further advancing its AD/ADAS technologies, such as LiDAR-based high-precision and highly-reliable sensing, high-definition camera sensing of all surroundings, and installation of a high-performance ECU compatible with Honda original AI and sensor fusion.

In addition, original Honda AI technology that combines the unsupervised learning[*4] technology of the U.S.-based Helm.ai and the behavior models of experienced drivers, which enable AI to learn with smaller amounts of data, and provide highly accurate driver assistance. This will enable the system to accurately predict risks and smoothly avoid them, even while driving on roads that are new to the driver/vehicle, enabling Honda to quickly expand the range of automated driving and driver assistance.

By advancing this technology, Honda will strive to be the first company in the world to expand the application of eyes-off functions to all driving situations and provide safer AD/ADAS which offer greater peace of mind for the customers.

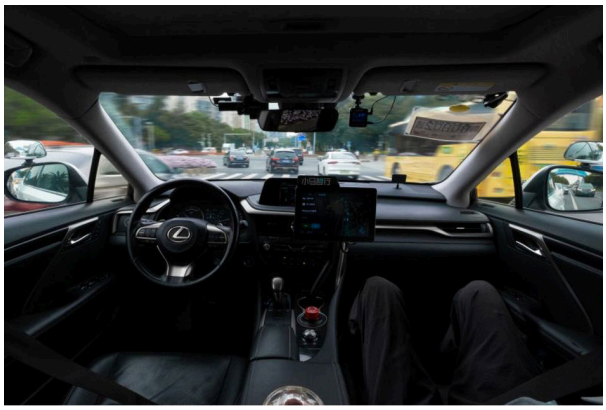


ADAS/AD Applications - Business Newsbites

Ambarella FQ3 '25 results – CV5/7 processors for ADAS driving business. While FQ3 automotive revenues were down, and L2 adoption remains slower than expected, Ambarella remains optimistic about the long-term potential of the CV5/7 processor platform and the L2+ market. CV5 shipped over 1Mu, with ASPs between $25 and $50. Europe remains a key market for Ambarella with China only accounting for 15% of the automotive pipeline. The company recently announced a design with Lotus and has historically been a major player in the automotive aftermarket. Ambarella shows that there is room in the ADAS space for smaller players and lower cost alternatives to Mobileye, Qualcomm and Nvidia.

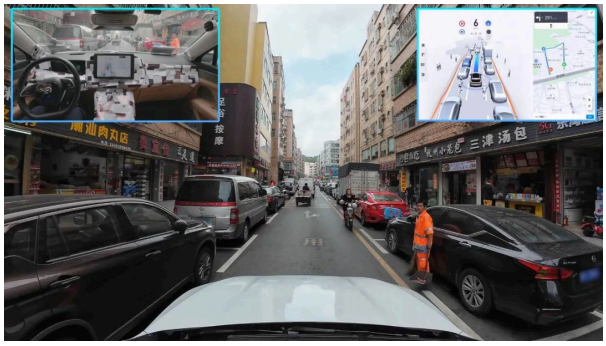
Mercedes is betting on China's Momenta to win back market share in China, with a planned investment and 4 new models to use the autonomous start-up's software. Mercedes had invested in Momenta since 2017, but this is one of the first jointly announced projects and shows a shift in strategy of the European automakers from relying purely on Mobileye or internally developed software to starting to use other alternatives for ADAS software, especially in the cost sensitive China market.

Qualcomm has set new growth targets for segments beyond mobile phones, including a $8B automotive revenue target by FY29. Qualcomm is projecting automotive revenue growth to $8B by FY2029, part of a $22B IOT business in a projected $900B "edge' TAM. Qualcomm has had a growing automotive business in Infotainment segment and is the dominant SoC supplier for higher-end platforms in that space. They are also gaining traction in the ADAS space with many designs for L2+/L3 systems in the pipeline.

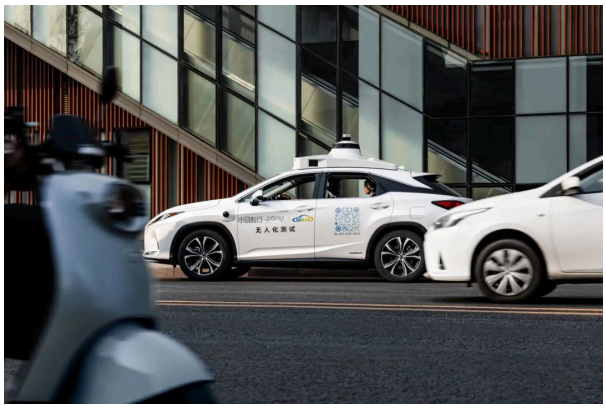


Uber is looking at an investment in China's Pony.ai US IPO and using the technology outside the US. As Robotaxis start coming to market, Uber needs to expand beyond its driver based model to include driverless options. At one point they had been developing their own solution, but that was cancelled due to cost and legal issues. Another option is to partner with full-robotaxi providers, like they are already doing with Waymo, Wayve and WeRide in some cities. Pony gives them another option in China.

Magna enhances ADAS capability by joining 5G partnership. The Northstar partnership with Telia and Ericsson helps support Magna's V2V and V2X developments enabling low latency Gbit speeds. Fast network speeds and quick response times are essential for timely alerts to drivers, preventing accidents, and minimizing their impact. Magna will install the 5G network at their Swedish test track to continue development of this technology. V2V/V2X has yet to be widely deployed, however, it has the potential to be an important part of the overall ADAS system.

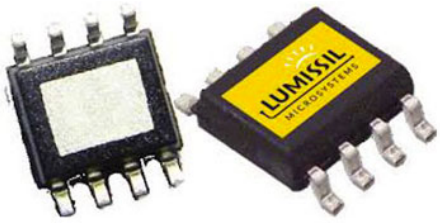


DeepRoute.ai, a Shenzhen-based autonomous driving technology startup, raised $100 million from Great Wall Motor. The startup aims to get its automated driving systems into as many vehicles in China as possible, before Tesla takes off in 2025. Deeproute is backed by Alibaba and had originally developed an L4 Robotaxi. The company shifted its focus to L2+/L3 systems in 2022 and has its system deployed in about 20,000 vehicles today with a goal to get to 200,000 systems by the end of 2025, including Greatwall and Mercedes vehicles. Tesla FSD is likely to get approval in China and Europe this year, so other manufacturers are looking at alternatives for competitive systems, and the China developed software seems to be taking off.



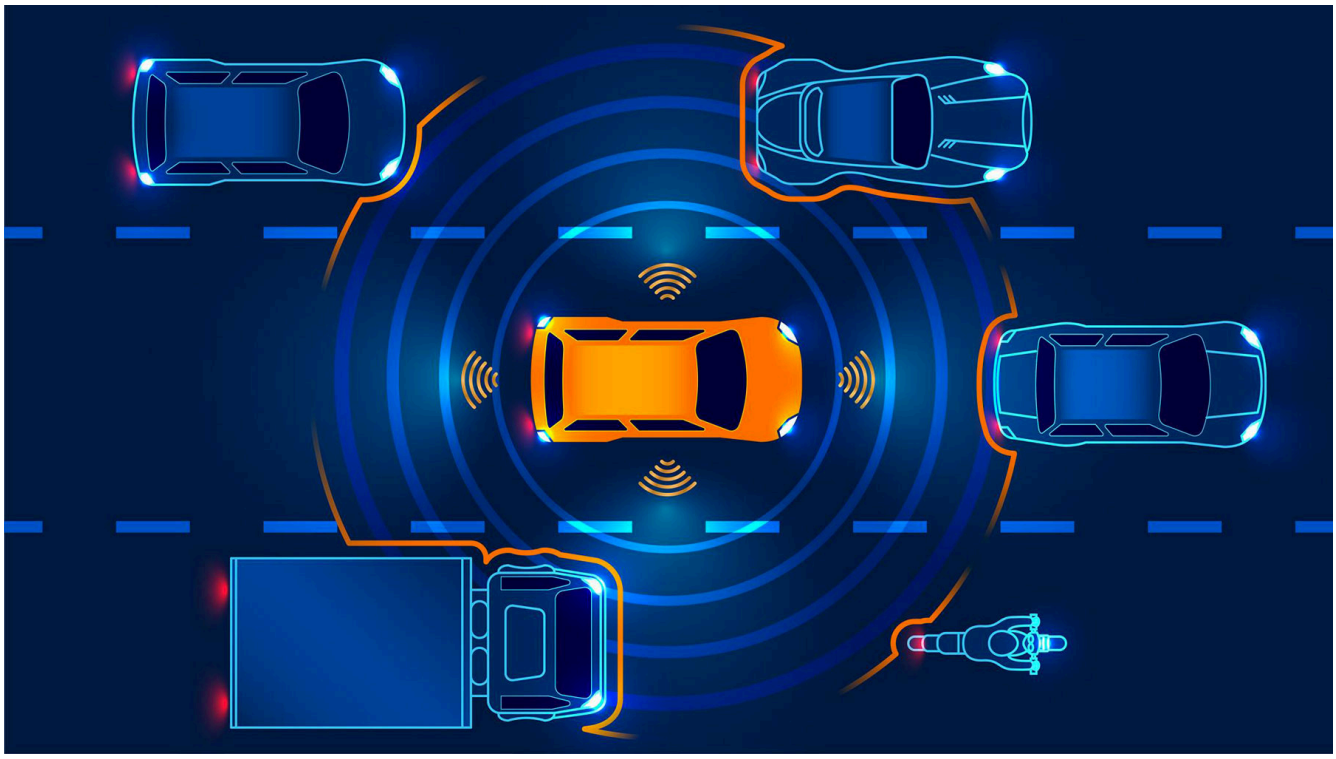
Pony.ai gets $70M investment from BAIC. Earlier in November BAIC announced collaboration with Pony for L4 autonomous driving with a first batch of Robotaxis set to launch in 2025. Pony is also developing Robotaxis with GAC.BAIC is one of the top 10 Chinese automakers, based in Beijing and has partnerships with Daimler and Hyundai.

Baidu launches Apollo 10 platform for AD development. Baidu had been one of the early developers of AD systems and its latest Apollo platform includes a level 4 stack that can run on a single Nvidia Orin NPU. The platform also includes LiDAR perception and integrates with the ROS ecosystem for easier deployment onto edge hardware. Many automakers have used the Apollo system, including Toyota, Geely, Daimler, BMW, Hyundai and Ford.



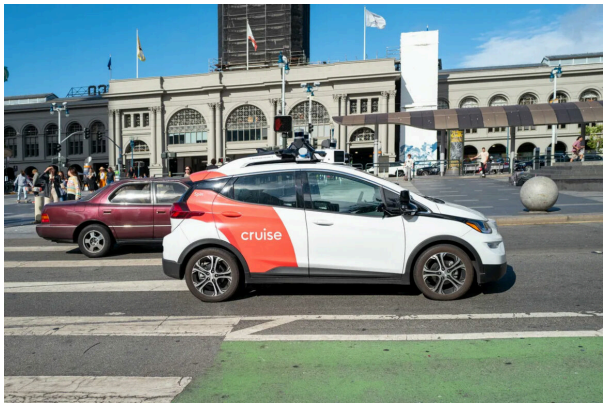
Lumissil controller for Matrix Adaptive Beam headlights – increases visibility while reducing glare. NHTSA is allowing the use of adaptive driving beam headlights in the US which will help improve nighttime driving safety and ADAS performance in the US market, while reducing on-coming glare, however the early ADB systems mostly used mechanical systems to control the beam. Matrix LED headlights represent a more advanced version of ADB allowing for finer control. Lumissil's controller allows for pixel level control with a CAN interface to a master controller and facilitates synergy between the ADAS and ADB systems. Integration of the lighting and ADAS system will become increasingly important on next generation ADAS designs that need improved nighttime performance.

ADAS/AD Deployment - Newsbites



Mercedes-Benz improves active parking assist – its vehicles can search for parking spaces at up to 35km/h and park twice as fast as before. Park assist comes standard on the E, S class and many of Mercedes's EVs and operate with the reversing camera and optionally the 360 degree surround view cameras. The car can search for perpendicular spaces with as little as 50cm clearance on each side and then pull in forwards or backwards. The system uses sensors to detect cross traffic, pedestrians and cyclists and can apply AEB if needed. This sort of function will becoming increasingly available on many car models as part of the ADAS package as we go forward.

Innovations in ADAS Calibration
Bosch Vision Positioning has a streamlined solution for calibration of ADAS systems after repairs. As ADAS technology becomes more complex, repair solutions like this are critical to keep costs down. Traditional sensor calibration involved tape measures and string lines, which are prone to human error. The Bosch DAS3000 system uses cameras to precisely align target boards allowing for consistent results, even with novice technicians. As L2+ ADAS becomes increasing common on vehicles, tools like this will be needed in the service industry to keep everyone on the road.

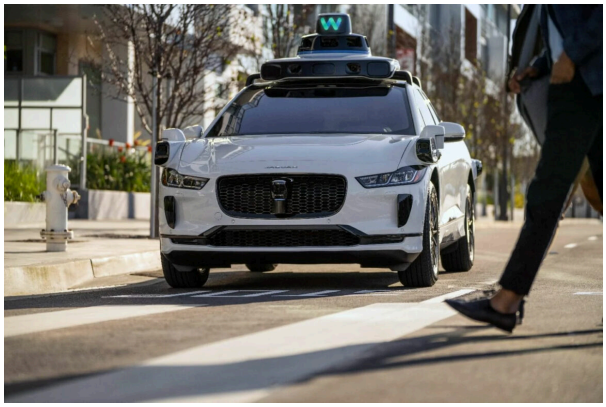


GM Shuts down its Cruise Robotaxi Service
GM said it would no longer fund the development of the Cruise Robotaxi. Activities are to be absorbed into GM with a focus on ADAS and eventually fully autonomous personal cars. Cruise raised a $2B round in 2021 (at a $30B valuation) from investors including GM, Honda and Microsoft. Microsoft said it will take a $800M hit from the closure in a regulatory filing. GM had struggled after a serious accident in San Francisco to keep up with competitors like Waymo and said it was taking too much time and resource to develop the Robotaxi service. Others in the industry think that perhaps they pulled out too soon, as Waymo is showing commercial service is a possibility and the market potential is still large. Learnings from the Cruise team are sure to be applied to GM's own level 3 driving capability however.

Trump team discussing relaxing rules for autonomous driving – creating a federal framework for autonomous cars, reduce existing roadblocks and increasing the number of self-driving cars allowed on public roads.
The policy details are not complete yet but will likely help accelerate the rollouts of full self-driving and Robotaxi services, benefiting Tesla and others. A federal framework could simplify compliance with the multiple state regulations that exist today. Currently NHSTA limits deployments of autonomous vehicles to 2500 per manufacturer per year.

May Mobility launches Autonomous Shuttle Service at Toyota's Miyata factoty – using the Toyota e-Palette vehicle.
The shuttle provides service for workers and guests. May Mobility has already provided over 400,000 rides in Japan and the US. Shuttle services, in a restricted area, like a campus or airport for example, are easier places to deploy robo-vehicle services versus the public roads and we are likely to see an increasing number of these services deployed by start-ups like May Mobility into the second half of this decade.

Waymo announced that it will be expanding to Miami in 2026.
After recent expansions in its driverless taxi service in Los Angeles and Austin. Florida's rainy conditions present new challenges for the AV software and Waymo plans to start testing with safety drivers in early 2025. Waymo is partnering with Moove for fleet management and charging. Waymo also announced in October it was working with Hyundai for its next generation vehicle. Waymo is already providing more than 1000,000 rides per week in San Francisco and Phoenix. I recently tried the Waymo service in San Francisco and will publish a report on that in our next newsletter.



Waymo to roll out service in Tokyo – partnering with Japan's top taxi service.
The service is planned to roll out in early 2025 and will beat the Japanese automakers to market. Nihon Kotsu will be in charge of managing and servicing of Waymo vehicles. Initially the taxi drivers will operate the vehicles manually, to map the central part of the city with autonomous operation scheduled at some later date. Japan is a very conservative market and this represents an important first step for broader autonomous deployment in the country.

BYD's Yangwang brand rolls out nationwide HD Map free urban auto pilot. Yangwang is BYD's high-end brand and the U8 offroad vehicles use BYD's "God's Eye" "Superhuman" ADAS system. The system offers urban Navigate on Autopilot capability that had previously relied on HD maps. The map-free update, allows for expanded coverage beyond the first 7 cities it supported to all regions of mainland China. US OEMs had also been split between HD Map based driving systems and map-free systems. The map-free option will become the standard in the future since it offers more flexibility.