Vehicle Technology That "Wows"

The Consumer Electronics Show put advanced concept cars, connected vehicles and autonomous mobility on center stage.

By Stacey Phillips

Members of the technology industry came together in January at the Consumer Electronics Show (CES) in Las Vegas, NV, one of the largest tech events of the year. More than 115,000 attendees from across the globe had an opportunity to connect, gain insights and be inspired by developments changing the world.

Owned and produced by the Consumer Technology Association (CTA)®, CES features every aspect of the tech sector. During the four-day event, 3,200 exhibitors showcased their products and services in all areas of emerging technologies, including 5G, artificial intelligence (AI), cybersecurity, internet of things (IoT), smart cities, and electric and connected vehicles.

The automotive and transportation sector is expected to be one of the most impacted by technology in 2023 –

39% compared to other sectors, according to a study by IEEE, an organization dedicated to advancing technology.

The study, titled "The Impact of Technology in 2023 and Beyond: an IEEE Global Study," surveyed global technology leaders from the U.S., U.K., China, India and Brazil. When asked what areas of technology will be among the five most important in 2023, responses included cloud computing (40%), 5G (38%), metaverse (37%), electric vehicles (EVs) (35%), and the Industrial Internet of Things (IIoT) (33%).

This year, an increasing number of OEMs exhibited at CES as part of the vehicle technology section. Concept cars, connected vehicles and autonomous mobility were all on display. In addition to traditional OEMs, technology companies showcased their entry into the automotive market.

Sony Honda Mobility introduced its new brand, Afeela (at left), at CES nearly one year after Sony and Honda announced their partnership to sell electric vehicles under the name Sony Honda Mobility. The company unveiled a four-door sedan prototype named Afeela, which will be produced at one of Honda's 12 plants in the U.S. It is expected that preorders for the vehicles will begin the first half of 2025 and cars will be delivered to customers in North America in spring 2026.

"As safety and security are essential to mobility, we are considering integrating Sony's sensors and the Honda safety along with other intelligent technologies," said Yasuhide Mizuno, CEO of Sony Honda Mobility.

New car technology was unveiled by Stellantis, including integrated software systems, steering concepts, electric versions of sports and muscle cars, as well as their fully electric Ram truck.

New technologies, such as those showcased at CES this year, are expected to continue revolutionizing the automotive sector, impacting consumer experiences and the industries involved.

Part of the automotive evolution includes the use of LiDAR (light detection and ranging), which is like radar but uses pulsed laser light to map a three-dimensional model of the environment. LiDAR technology has been used in the past for smart vehicles and systems.

According to research from McKinsey & Company, LiDAR sensors are positioned for strong growth (an anticipated rate of ~80 percent p.a. through 2030).

"This technology is currently only in place in a limited number of vehicles, but these sensors will be key elements of the growing number of SAE AV Level 3+ vehicles," noted the McKinsey & Company report, "Automotive software and electronics 2030."

With automakers increasingly using LiDAR on production vehicles to help improve ADAS technology, many companies showcased its use during CES.

One of which was Cepton, founded in 2016. The San Jose, CA-based company provides LiDAR-based solutions for a range of markets, such as automotive (ADAS/AV), smart cities, smart spaces and smart industrial applications.

Cepton's LiDAR technology is being used in GM's Level 3 system, Ultra Cruise, which was announced in July 2022.

"Ultra Cruise works through a combination of cameras, radars and LiDAR, developing accurate, 360-degree, three-dimensional statistical representations of the environment surrounding vehicles with redundancies in critical areas," according to a GM press release. "Ultra Cruise also incorporates an integrated LiDAR behind the windshield."

In 2022, Cepton CEO and Co-Founder Dr. Jun Pei said that LiDAR is going mainstream and will be deployed in ADAS in everyday consumer vehicles available in the next few years. "This sensor technology is not only capable of improving vehicle safety but also critical in enabling higher levels of autonomy," he said.

Cepton unveiled a new LiDAR technology in January, the Vista®-X120 Plus, which was named an honoree for the 2023 CES Innovation Awards in the Vehicle Tech & Advanced Mobility category. Created to be slim and compact, the Vista-X120 Plus provides real-time adaptive 3D perception for vehicles.

"Utilizing OEM-validated building blocks, the Vista-X120 Plus aims to enhance vehicle safety across all levels of automation," said Pei.

During Hyundai Mobis' media showcase, President Cho Sung-Hwan presented the company's vision of "New Mobis" – Mobility Beyond Integrated Solution – a mobility company that provides an integrated platform combining software and hardware.

Executives introduced their research and development strategies for future mobility, which included developing a level three integrated autonomous driving controller and software platform utilizing Snapdragon Ride Platforms by Qualcomm.

Hyundai Mobis also debuted two purpose-based vehicle (PBV) concept models. The M. Vision TO autonomous vehicle is designed to support various applications, from driving down a narrow street or transporting cargo. It has the ability to do "crab driving" and zero-turn with 90 degrees rotating wheels.

M. Vision HI is designed for leisure, relaxation and outdoor activities. The vehicle's glass can be used as a large display screen to watch movies or shop online and features gaze-assisted remote-control technology that utilizes the user's eyes as the controller.

Cheon Jae-seung, the head of Future Technology Convergence Institute (FTCI), emphasized that software and semiconductors are the core competitiveness of integrated solutions. "Reliable software and semiconductor technologies are the key to the future mobility solutions that we provide," he said.

California-based electric vehicle company Faraday Future displayed its FF 91 Futurist in the Innovusion booth at CES. Innovusion's Falcon LiDAR powers the FF 91's autonomous driving system and provides real-time 3D vision, even in adverse weather or nighttime, to provide a safer and more reliable driving experience.

With Innovusion's Falcon LiDAR, the company said that other vehicles can be detected up to 1,600 feet away and pedestrians and small road debris can be detected more than 650 feet away.

Faraday Future expects to start production of the FF 91 Futurist at the end of March 2023. The vehicle has 1,050 horsepower, an EPA-certified range of 381 miles, and can travel 0-60 mph in 2.27 seconds.

"The Consumer Electronics Show is the pinnacle setting of the newest and most influential technology in the world, so it was essential that we bring our technology-packed flagship FF 91 Futurist back to this show," said Xuefeng ("XF") Chen, Global Chief Executive Officer of FF.

Innovusion's Falcon LiDAR powers the FF 91's autonomous driving system and provides real-time 3D vision, even in adverse weather or nighttime, to provide a safer and more reliable driving experience. FF 91 Futurist is seen below, pictured from the company's website.

"With partners like Innovusion, the FF 91 Futurist will set new standards in driver assistance technologies that will help us achieve new levels of safety, driver comfort, and convenience in the luxury electric vehicle marketplace."

A two-person Solar City Car was debuted by Squad Mobility, a Dutch company founded in 2019 by Robert Hoevers and Chris Klok. Their vision is to make solar-powered mobility widely available and affordable.

The Solar City Car uses solar energy to charge the battery through an integrated solar panel on the roof. It can also be charged using a 220v power plug or charging point.

Squad Mobility is currently accepting preorders for the Squad L6, which is expected to begin production in 2024 and will travel up to 45 km/h (27.9 mph). The maximum speed of the L7 is 70 km/h (43 mph). It will initially be a two-person vehicle but later be offered for four.

Hoevers said that the Solar City Car offers energy generation, storage and usage in a single product. "We are seeing a tremendous interest from the U.S., specifically for markets such as sharing platforms, gated communities, campuses, (seaside) resorts, tourism, company terrains, hotels and resorts, amusement parks and inner-city services," he said.

CES also featured software companies, such as STRADVISION, that use AI to provide the technology behind ADAS and autonomous vehicles. STRADVISION's award-winning SVNet software is available for those

Centro Electric Group debuted its first hydrogen fuel cell vehicle, the Class 8 Semi Tractor LMH864.

using the Texas Instrument TDA4 automotive processor for Level 2 advanced driver-assistance systems (ADAS) L2 designs and widespread automated driving features. "… the next step in our journey is providing a vision solution for OEM mass production that meets key performance requirements for L2 and the next level," said Junhwan Kim, CEO at STRADVISION.

MORAI exhibited its autonomous driving simulation technology via its simulation platform MORAI SIM. The South Korean technology company develops simulation platforms to verify the safety and reliability of autonomous vehicles.

"MORAI SIM helps users verify vehicles and systems by establishing a virtual environment, digitally simulating everything from complex physical conditions to weather and even lighting changes," according to a MORAI press release. "In the case of self-driving automobiles, MORAI SIM provides a simulation environment identical to reality and a virtual platform that includes sensors, vehicle models and scenarios to enable verification that ensures reliability and safety of the self-driving systems."

"Simulation has been drawing attention as a major breakthrough technology to promote mobility innovation as it can quickly, safely and cost-effectively verify the safety and functionality of autonomous driving systems," noted Jiwon Jung, CEO of MORAI.

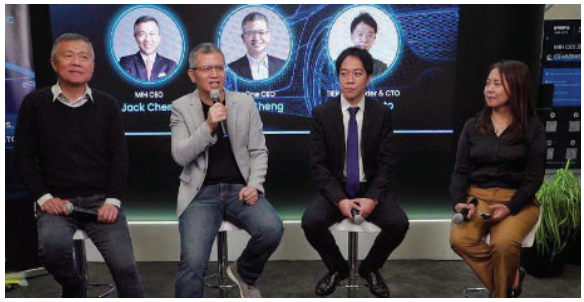
Centro Electric Group debuted five electric commercial vehicles (ECVs), including three variations of the all-electric iChassis. The open-platform, programmable iChassis is designed for automated and autonomous driving. The company also unveiled its first hydrogen fuel cell vehicle, the Class 8 Semi Tractor LMH864. The company's ECVs are designed to serve a variety

of applications from last-mile delivery to vocational services and other commercial applications.

"Autonomous vehicles have the potential to widely impact society…" said Marianne McInerney, Chief Marketing Officer. "Imagine the many vocational business uses where automated and autonomous driving could bring greater productivity and efficiency, improved customer service and increased workplace safety."

With the growing interest and development in autonomous driving, AEye and PAVE (Partners for Automated Vehicle Education) held a Safer Mobility reception at CES, where they released findings of a joint survey in regard to consumer attitudes about transportation safety. In November 2022, PAVE and AEye surveyed 1,095 adults to learn their views on road safety for all road users. The Safer Survey found that 83% of drivers worry about being involved in a collision and 78% of respondents said technology is important in solving driving safety issues.

"Respondents are confident that road safety technologies can significantly improve safety for drivers, pedestrians and bicyclists alike," according to the report. "The survey results showed 82% of respondents feel safer with technology-driven advanced driver-assistance systems (ADAS) in vehicles."



Max Cheng (second from left), CEO of VicOne, sharing his insights on the future of e-mobility during a fireside talk at CES 2023, with (from left) Jack Cheng, CEO of MIH; Shinpei Kato, founder and CTO of Tier IV; and Myla Pilao, marketing director of VicOne, who moderated the talk.

In addition to the expo, a full conference program was held with global industry leaders sharing their insights about technological advancements.

Cybersecurity experts talked about the future of EV mobility and the technologies accelerating it. During a "fireside chat" at the show, Max Cheng, CEO of VicOne, Jack Cheng, CEO of MIH, and Shinpei Kato, founder and CTO of Tier IV, shared some of the challenges and opportunities for autonomous driving and cybersecurity and how OEMs and Tier 1 Suppliers can best prepare.

When asked his thoughts on the future of e-mobility, Max Cheng said, "We would like to remind all automobile industry players and [their] leadership to put cybersecurity on the e-mobility agenda to ensure a robust

Industry players and leadership [should] put cybersecurity on the e-mobility agenda to ensure a robust cybersecurity strategy that will encompass the entire supply chain.

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cybersecurity strategy and build a bigger and more holistic platform that will encompass the entire supply chain."

Another highlight at CES was the Indy Autonomous Challenge (IAC), held at the Las Vegas Motor Speedway. Nine teams representing 17 universities in six countries competed. The PoliMOVE team, part of the MOVE research team at Politecnico di Milano in Italy, and the University of Alabama won the second annual racing event reaching speeds of 180 mph, which race organizers said was a new autonomous speed world record for a racetrack.

"We're harnessing the power of head-to-head competition to push and test the limits of autonomous driving to further the state-of-the-art technology in safety and performance of automated vehicles…" said Paul Mitchell, president of IAC.

"[This was] a major step forward in speed, in complexity of the race, and in overcoming challenging head-to-head situations. We are very glad for this success, for the contribution of the Indy Autonomous Challenge, and for all the teams in advancing the technology of AI drivers," said Prof. Sergio Savaresi, team lead of Politecnico di Milano.

The research team is focused on automation and control in vehicles. It has 20 years of research and development experience in cooperation with leading automotive companies, such as Ferrari, Lamborghini, Maserati, JLR, Hyundai, Bugatti-Rimac, Bosch, Brembo, Pirelli and others.

"This competition can be very helpful to focus research group capabilities in the development of a complex problem in the class of autonomous-vehicle design," the team said. "It can boost research and know-how in the autonomous-car big challenge."

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Stacey Phillips is a freelance writer and owner of Radiant Writing & Communications, where she specializes in providing content and digital marketing for the collision repair industry. She also serves as the marketing director for CIECA since 2017.