What's on the Inside?

With 8 million autonomous vehicles expected to enter the world in the next five years, what will their interiors be like?

By Jim Romeo

"One day your car may speed along an electric super-highway, its speed and steering automatically controlled by electronic devices embedded in the road. Highways will be made safe—by electricity! No traffic jams ... no collisions ... no driver fatigue."

That's how the copy reads for a Central Power and Light Co. advertisement from 1956, 62 years ago. The ad depicts a happy family speeding down a freeway's center lane alongside other conventional cars, in a convertible driverless vehicle. Their faces shine with bright, genteel smiles as they play dominoes.

More than 60 years later, the autonomous vehicle—one that is capable of sensing its environment and navigating without human input—is making a slow and steady appearance as transportation for everyone. The world's steadfast effort to go driverless—with cars, trucks, planes, trains, boats, and more—offers innovation not just on the outside and mechanics of the vehicle, but also on the inside. The interiors of autonomous vehicles promise to feature the epitome of modern materials, styling, innovation, and functionality.

Everything Old Is New Again

Our infatuation with a driverless vehicle began a long time ago, even before the 1960s. The dream has never gone away. This time, however, it seems to be on its way to a reality.

An early representation of an automated guided car was shown at General Motor's Futurama exhibit at the 1939 World's Fair. It depicted radio-controlled electric cars that were propelled via electromagnetic fields provided by circuits embedded in the roadway, like a glistening new toy set that depicted transportation utopia.

This 1956 Central Power and Light Co. advertisement (www.velocetoday.com) reads: "Electricity may be the driver. One day, your car may speed along an electric super-highway, its speed and steering automatically controlled by electronic devices embedded in the road. Highways will be made safe—by electricity! No traffic jams ... no collisions ... no driver fatigue."

All photos courtesy of Jim Romeo

Norman Bel Geddes, the industrial designer behind General Motors Corp.'s exhibit, described the envisioned system in his 1940 book, *Magic Motorway*. In it, he promoted advances in highway design and transportation, foreshadowing the Interstate Highway System, and argued that humans should be removed from the process of driving. Bel Geddes forecasted that advances would be a reality in 20 years:

"But these cars of 1960 and the highways on which they drive will have in them devices which will correct the faults of human beings as drivers. They will prevent the driver from committing errors. They will prevent his turning out into traffic except when he should. They will aid him in passing through intersections without slowing down or causing anyone else to do so and without endangering himself to others."

Preparing to Be a Passenger

If and when autonomous vehicles are widely adopted, the role of a vehicle operator will change to become less of a driver and more of a passenger. This shift is a major part of the change to come.

The Society of Automotive Engineers International (SAE) outlines the five levels of control. Level 0 is when the driver is in full control. It proceeds to Level 1, in which limited steering and acceleration tasks are automated, and the driver controls the rest. The scale progresses up to Level 5, in which full automation in all conditions is in effect.

According to ABI Research, a market-foresight advisory firm, 8 million consumer vehicles will hit the roads in 2025 with SAE Level 3 and 4 technologies; in these vehicles, "drivers will still be necessary but are able to completely shift safety-critical functions to the vehicle under certain conditions and SAE Level 5 technology, where no driver will be required at all."

With the focus off the road ahead, this change will bring more importance to the vehicle interior, specifically to its feel, look, and functionally. The cabin area of an autonomous vehicle will play two roles: one in terms of form, livability, and style, and the other in terms of function as the driver must still be prepared to take over control.

The Zen of Autonomous Interiors

Siemens PLC Software has all eyes on the market for automotive interiors. In a blog entry, (https://community.plm.automation.siemens.com/t5/Digital-Transformations/How-will-autonomous-cars-look-as-they-hit-the-road/ba-p/445930), the vice president of strategic automotive initiatives for the company's Specialized Engineering Software, said that the "impact of autonomous car and mobility service providers will likely become similar to that of companies in the airline industry. People on airplanes don't care about whether they're in a Boeing or an Airbus; they care more about a particular airline's service or the amenities of the airplane's interior, like the comfort from a lie-flat seat in business or first class."

Autonomous vehicle technology presents automotive designers and manufacturers with new and innovative designs and functionality.

Bernardon affirms the same mindset will apply to autonomous car interiors. "Your mobility experience will be delivered by the interior," he says. "So, there is a lot of interest in what it's going to be like, especially if you think of an autonomous car as a living room on wheels, with possibilities maybe as varied [as the] stationary living room in your home."

Industrial designer Aleksandra Gaca explains her concept for the future of interior design in an article on the industrial design website Core77.com. She characterizes our potential relationship with the interior as an opportunity to reinvent it in the age of the autonomous vehicle.

Gaca specifically describes her assignment from French car manufacturer Renault to design interior fabrics for the visionary Renault SYMBIOZ as a concept car and, well, an extension of home. Picking fabric wasn't enough for Gaca or for Renault, it seems. Instead, when it came to fabric for this futuristic, beyond-luxury vehicle, she created her own. She writes: "I translated Renault's needs into woven form and created a new version of Bloko, a 3D fabric. The new Bloko, in two shades of gray, covers the car seats and the upholstery of the large sofa in the home, uniting the two spaces and giving them a touch of warmth and a reassuring feel."

Her approach, Renault's approach, and what seems to be everyone's approach to autonomous vehicles, is to invent a new mobile experience. The interior of an autonomous vehicle will become the intersection of mobil-

ity, utility, convenience, technology, and (don't forget) transportation.

As Gaca describes it: "The Renault SYMBIOZ concept car was conceived as an extension of the home on the road. When parked inside the home, it becomes a mobile, modular, and multi-purpose additional room. The goal of the design was to make sure the cabin was livable like any modern home."

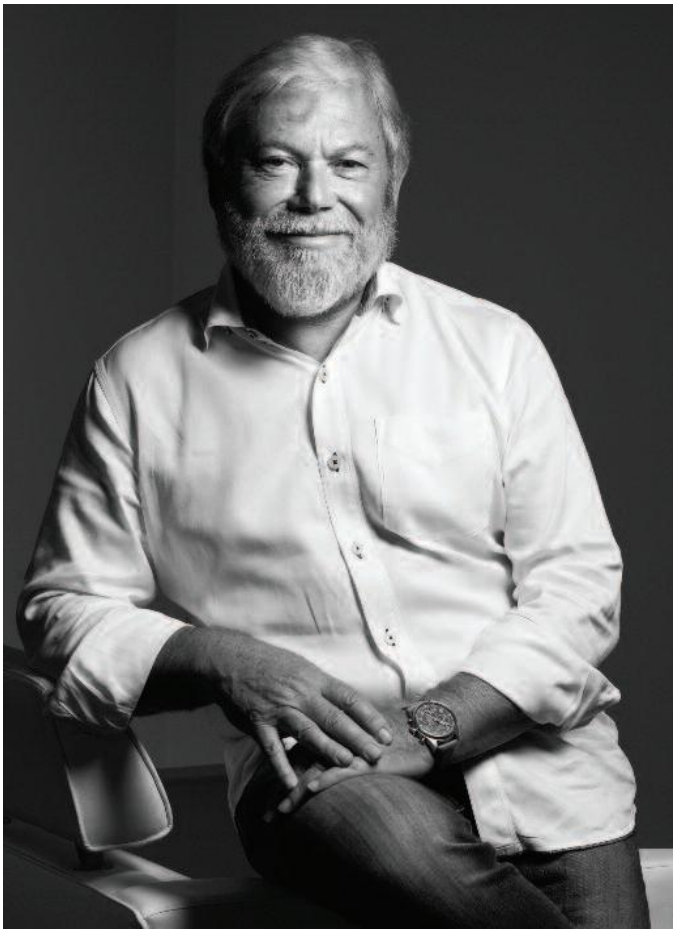
But there's also the functionality of the interior; in fact, it's quite important. Automotive designers are eliciting ideas from many other designers and thinkers in art and design schools around the country. The *New York Times* reported on Calvin Ku of the ArtCenter Design Center in Pasadena, Calif. Ku is a graduate student in transportation systems and design. His thesis, "Enthusiast Autonomous Experiences," emphasizes the need to focus on a unique synergy or partnership between driver and vehicle in creating the interior and human factor functionality of the autonomous vehicle.

Ku took to horseback riding and tango dancing to examine the unique chemistry that exists in such avocations (horse and rider, dancer and partner) and applied the same chemistry to driver and vehicle. In the article, he described the relationship as somewhat abstract and creating "intelligent companions in a dynamic, visceral, and evolving relationship."

Other companies are also embracing the synergy they believe will exist between an autonomous vehicle and its driver, since the functionality of the vehicle will be so attuned to the driver's creature comforts and disposition. "Interiors on autonomous vehicle platforms will be taking on a totally new approach," says Tony Lancione, vice president of supply chain solutions at IndustryStar Solutions in Ann Arbor, Mich. "They will be approached more

Above: Thanks to a convergence of technological advances, automated driving systems are becoming a reality. Their carefully designed interiors will potentially increase productivity and improve the quality of life for millions of people. Top right: The interior of an autonomous vehicle will play two roles: one of form or comfort and style, but also functionality whereby the driver may be prepared to take control over the vehicle. Right: The future of autonomous vehicles is full of promise. Their interiors will play an important part in the aesthetics and comfort of being in the vehicle but also in its functionality and utility to the passenger.

Avi Reichental, founder and chief executive officer of XponentialWorks, is now leading partnerships between traditional auto part manufacturers and 3D printing tech startups to create unprecedented features that major auto manufacturers are integrating into self-driving cars. He says the transformation to autonomous vehicles and their newer technological interiors will require a mindshift to leaving the classic paradigm of driving behind. Instead of being the chauffeur, they are now being chauffeured.



as a living space as opposed to a vehicle. The dynamic is totally shifting where an individual will no longer have the road as his or her number one focus, but comfort, instead."

The interior design will have added emphasis on comfort and functionality to parallel other parts of our "smart" life by offering features we're used to seeing with our smart homes, smart phones, and other 21st-century innovations. Panasonic Corp., for example, is rethinking the interior lighting of such vehicles to match it to a driver's mood or providing technology that will allow passengers to search for nearby parking spots.

Panasonic, as well as students at design schools, are also shifting the focus of another interior element with an important new function: the windshield. In full-fledged autonomous mode, a vehicle's windshield could, remark-