

## TECH

# Tesla Expects to Demonstrate Self-Driven Cross-Country Trip Next Year

Auto maker begins equipping all its vehicles with hardware to make them fully self-driving



The interior view of a Tesla Motors Model S P90D, a model with some autopilot features, is seen during an exhibition featuring several self-driving cars in Washington, D.C., in March. *PHOTO: BLOOMBERG NEWS*

By **TIM HIGGINS**

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Tesla Motors Inc., preparing for a future of self-driving cars, has begun equipping all its new vehicles with the hardware required to make them entirely capable of driving themselves.

Chief Executive Officer Elon Musk announced the changes on Wednesday, saying his goal is to demonstrate a vehicle traveling in fully autonomous mode from Los Angeles to New York by the end of next year. Autonomous features will be introduced over time based on what he dubbed “Hardware 2,” he said.

Tesla cars already come with a semi-autonomous system called Autopilot. But having a fully autonomous car on the road by 2018 would put the Palo Alto, Calif., auto maker ahead of major car companies racing to develop their own self-driving models. Companies from Ford Motor Co. to BMW AG have proposed fully autonomous vehicles in 2021. Alphabet Inc.’s Google has a fully autonomous test fleet on public roadways, but

the company hasn't detailed its plan for the technology it has been working on for more than seven years.

The software that would make Tesla vehicles fully self-driving still needs to be validated, and the system hasn't been approved by regulators. The company expects to reach those milestones in time, ultimately leading to vehicles that Mr. Musk said would be significantly less dangerous than current cars.

"It will take us some time into the future to complete validation of the software and to get the required regulatory approval, but the important thing is that the foundation is laid for the cars to be fully autonomous at a safety level we believe to be at least twice that of a person, maybe better," Mr. Musk told reporters on Wednesday.

Tesla used a similar strategy to introduce the semi-autonomous Autopilot feature, rolling out the hardware before the software was complete. Vehicles built after October 2014 came equipped with the parts that Autopilot would eventually use, such as radar. Tesla turned on the feature in late 2015 using the company's ability to update its vehicles' software over the air.

High-end Model S and Model X vehicles equipped with hardware for full autonomy are already in production, and the Model 3, the company's mid-priced sedan slated for delivery late next year, will have it as well, Mr. Musk said. Previously built vehicles without the new hardware won't have the fully autonomous features.

The new hardware will initially lack some capabilities of Autopilot, including automatic emergency braking, collision warning, lane holding and active cruise control. Those and other features will be enabled as the company works to calibrate the new system, the company said.

That should take two or three months, Mr. Musk said. Thereafter, he said, the company plans to upgrade its autonomous capabilities every two or three months.

"It's extremely impressive where they've gone, but if the technology can't be used it seems like a moot point for most people," said Jessica Caldwell, an industry analyst with Edmunds.com, a website that tracks new cars. "It's hard to get excited about something you can't do, and you can't really utilize this."

Tesla's effort to introduce the next generation of autonomous driving capability comes as the auto maker faces increasing scrutiny over the semi-autonomous Autopilot system. The current version uses cameras, sensors and radar to control vehicle speed and steering under certain driving conditions. While not a fully self-driving system, it is regarded as a major step toward that end.

However, some observers worry that the technology lulls drivers into complacency behind the wheel. Germany's Transportation Ministry has asked Tesla not to use the term Autopilot in ads describing the system and the California Department of Motor Vehicles has issued draft rules that would prohibit the use of "auto pilot" in marketing materials for systems similar to Tesla's.

U.S. regulators are investigating a fatal crash that occurred in May in Florida, which Tesla has said was the first known fatality involving Autopilot. An update to Autopilot's software last month may have prevented that crash, Mr. Musk has said. The changes included making the system more reliant on radar to navigate.

Mr. Musk expressed his frustration with the large amount of attention received by Autopilot crashes relative to automobile crashes in general. "It does not reflect well upon the media," he said. He noted that a negative story dissuading people from using autonomous vehicles was effectively "killing people" since the technology made driving safer.

The new system has eight cameras, compared to one in previous Tesla vehicles, providing 360 degrees of visibility up to 250 meters in range, while the on-board computer has more than 40 times the computing power of the previous generation, according to Tesla. The software is being developed in-house, Mr. Musk said.

Customers will be offered two options when buying a Tesla vehicle, Mr. Musk said: Fully autonomous mode and an enhanced Autopilot mode that has improved cameras and computing power to perform more complex maneuvers, such as navigating freeway on-and off-ramps.

### **Corrections & Amplifications:**

Tesla expects to demonstrate a vehicle traveling in fully autonomous mode across the country by the end of next year. The headline on an earlier version of this story incorrectly said it would be by year-end. (Oct. 19, 2016)