

Tesla FSD v12 shifts away from 'rules-based' approach

Walter Isaacson's Elon Musk biography is set to be published on Tuesday, and a new preview of the book illustrates details about Tesla's development of the upcoming Full Self-Driving (FSD) version 12.

In an additional [preview of his Musk biography](#) for [CNBC](#), Isaacson discusses the use of AI in the development of Tesla's FSD v12, in a shift that took place within the last several months. Isaacson talks about Tesla's recent development of the upcoming FSD v12, which he and Tesla demonstrate has moved away from a "rules-based" approach.

Notably, FSD v12 is expected to use billions of video frames from real-world driving incidents to train its neural network rather than using thousands of lines of code like previous versions. In a conversation with Musk last December, Tesla Autopilot employee Dhaval Shroff had likened the concept to the popular chatbot ChatGPT, instead for use with driving.

"It's like ChatGPT, but for cars," Shroff said. "We process an enormous amount of data on how real human drivers acted in a complex driving situation, and then we train a computer's neural network to mimic that."

Surprisingly enough, Tesla only shifted toward this "neural network planner" approach recently. By the beginning of this year, however, the neural network had already analyzed 10 million video clips based on the best-case-scenario drivers the system had access to. Musk instructed employees at the company's Buffalo, New York facility who were in charge of analyzing the footage to train the AI on things "a five-star Uber driver would do."

Moving from a rules-based to a network-path-based AI approach allowed [FSD](#) to use human driving data to avoid obstacles, even if breaking some rules was necessary. Shroff helped demonstrate the idea to Musk with a demo featuring trash bins, debris, and upturned traffic cones, which the car handled surprisingly well.

"Here's what happens when we move from rules-based to network-path-based," Shroff explained. "The car will never get into a collision if you turn this thing on, even in unstructured environments."

Musk quickly took to the idea, as can be seen in a recent [livestream of Tesla's FSD v12 software](#) in Palo Alto with Autopilot software director Ashok Elluswamy. He has repeatedly spoken about the upcoming software version's impressive driving results, despite one small moment in the drive where the car almost ran a red light.

In any case, Musk could argue that the red-light moment is a good case for the *need* for self-driving software to continually learn. Given that it will constantly be trained from the video data generated by

[camera footage from real-world drivers](#), it should theoretically make it safer over time, according to Musk.

During development, Musk also reportedly latched onto the fact that it took over a million video clips for the neural network to begin performing well, though he looks forward to what significantly more data will do for FSD.

Still, critics and [regulators have expressed concerns about the faults of human drivers training AI-based driving systems](#), and Tesla has repeatedly been questioned by the National Highway Traffic Safety Administration (NHTSA) about its [Autopilot](#) and FSD beta systems.

According to Isaacson, Tesla plans to release FSD v12 as soon as regulators approve it. Meanwhile, an ongoing study by the National Highway Safety Board is looking to determine if [self-driving cars](#) should be permitted to imitate human driving actions that blur traffic rules, such as creeping up at stop signs.

Musk said in April that he expects [Tesla to reach full autonomy within a year](#), though he has also been known to share ambitious targets for the software in the past.

You can read Walter Isaacson's full account of the development of Tesla FSD v12 [here](#), in a *CNBC* preview of the upcoming Elon Musk biography.

What are your thoughts? Let me know at zach@teslarati.com, find me on X at [@zacharyvisconti](https://twitter.com/zacharyvisconti), or send your tips to us at tips@teslarati.com.

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Credit: Elon Musk/X

X has filed a lawsuit against a California bill requiring social media companies to post and submit moderation information to the state. The company alleges that the legislation has underlying motives that go against the Constitution's protection of free speech — a common message echoed by leader Elon Musk over the years.

On Friday, [Musk](#) reposted a tweet from the [X Global Government Affairs](#) account, formally announcing that the social media company has filed a lawsuit against [California AB 587](#).

The bill, signed into law by California Governor Gavin Newsom last year, mandates that social media platforms post and submit regular terms of service information about how they moderate racism, extremism, disinformation, harassment and foreign political interference to the Attorney General on a semiannual basis.

In the [lawsuit](#), dated September 8, X attorneys argue that, while California has propped up the bill as a “transparency measure” for content moderation, it instead seeks to “pressure companies to eliminate or minimize content that the government has deemed objectionable.”

X's legal team also alleges that the state is forcing them to take positions on politically charged and controversial terms determined by the state, saying that this violates principles of free speech. Below is an excerpt from section 3 of the lawsuit:

“AB 587 violates the First Amendment of the United States Constitution and Article I, Section 2, of the California Constitution because it compels companies like X Corp. to engage in speech against their will, impermissibly interferes with the constitutionally-protected editorial judgments of companies such as X Corp., has both the purpose and likely effect of pressuring companies such as X Corp. to remove, demonetize, or deprioritize constitutionally-protected speech that the State deems undesirable or harmful, and places an unjustified and undue burden on social media companies such as X Corp.”

According to AB 587, social media companies must also submit detailed information about how many items are flagged on their platform and how often users viewed and shared the content. Below is an excerpt from AB 587's introduction paragraph:

“This bill would require a social media company, as defined, to post their terms of service for each social media platform, as defined, owned or operated by the company in a specified manner and with additional specified information, subject to certain exceptions.”

This is far from the first time Musk has shared his views on free speech using X.

Before initiating a deal to purchase the company formerly known as Twitter last spring, [Musk](#) shared a poll asking if the company “[rigorously adheres](#)” to [principles of free speech](#). Last December, [Musk shared the “Twitter Files,”](#) which targeted former executives of the social media company, claiming that they intentionally suppressed free speech. These are just a few examples of Musk’s self-proclaimed “free speech absolutism.”

You can read the full text of California bill AB 587 [here](#), and you can read X’s 35-page lawsuit against the bill [here](#).

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(Credit: Tesla)

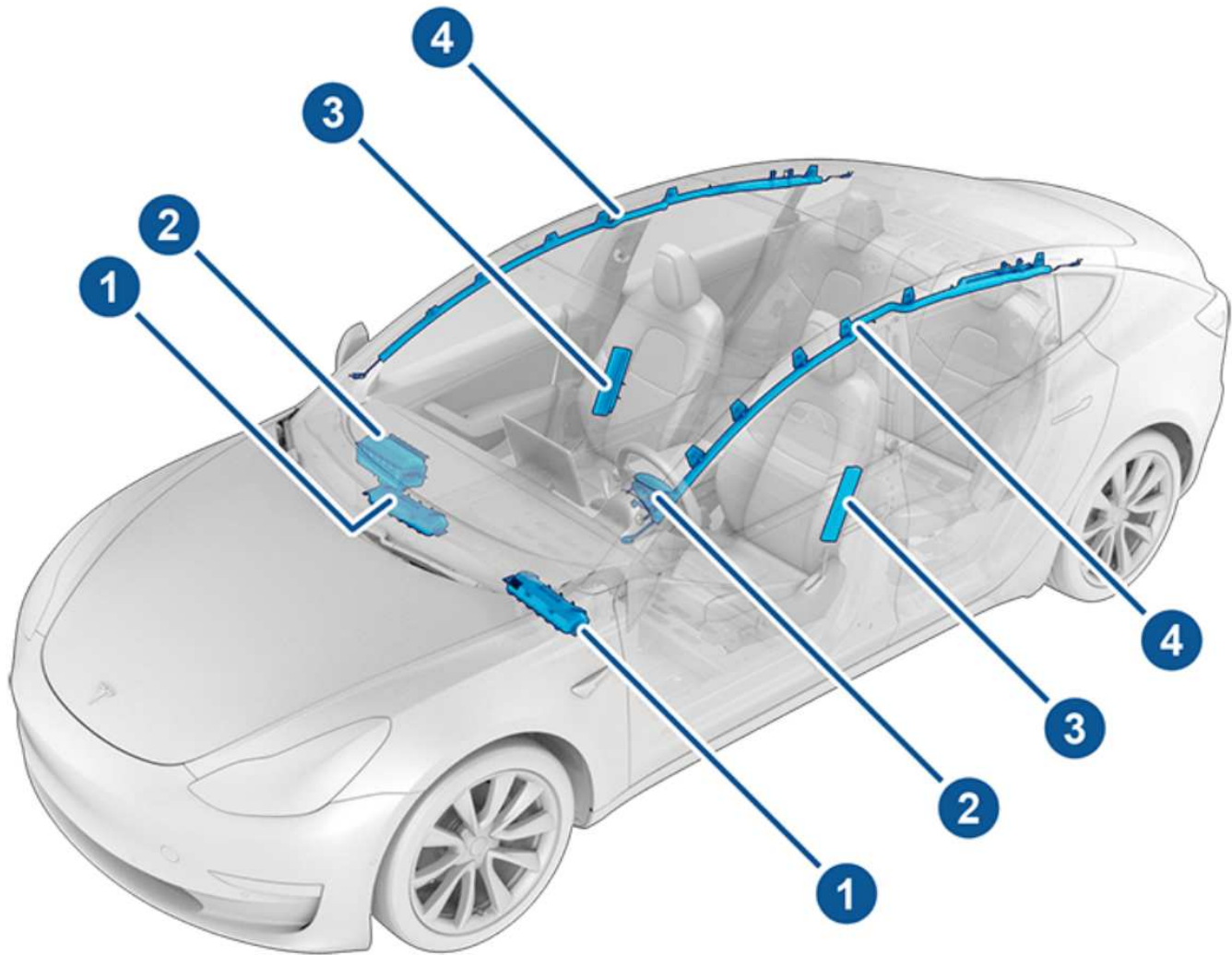
Tesla’s redesign of the Model 3 has now been unveiled in many markets, featuring the removal of several components — notably including the removal of a shifting stalk.

Since the announcement, however, some have also spotted that Tesla may have removed a front-seat airbag from the design, leaving some onlookers with questions.

Earlier this week, Reddit u/[Capital-Pomegranate6](#) noticed that the new Model 3 doesn’t include a knee airbag for front-seat passengers, as spotted in the [French owner’s manual](#). Interestingly, the

manual also shows that the design has an additional airbag inside the driver's seat, which appears to be the same one [noticed in China-built Model Y units](#) last year.

Some users responded that the design could be region-based, depending on what airbags are available in certain countries. Others said that U.S. regulations may require knee airbags while European countries don't. However, *u/Capital-Pomegranate6* reiterated that their Model 3 does include the knee airbags, though others outside of North America pointed out that theirs didn't.



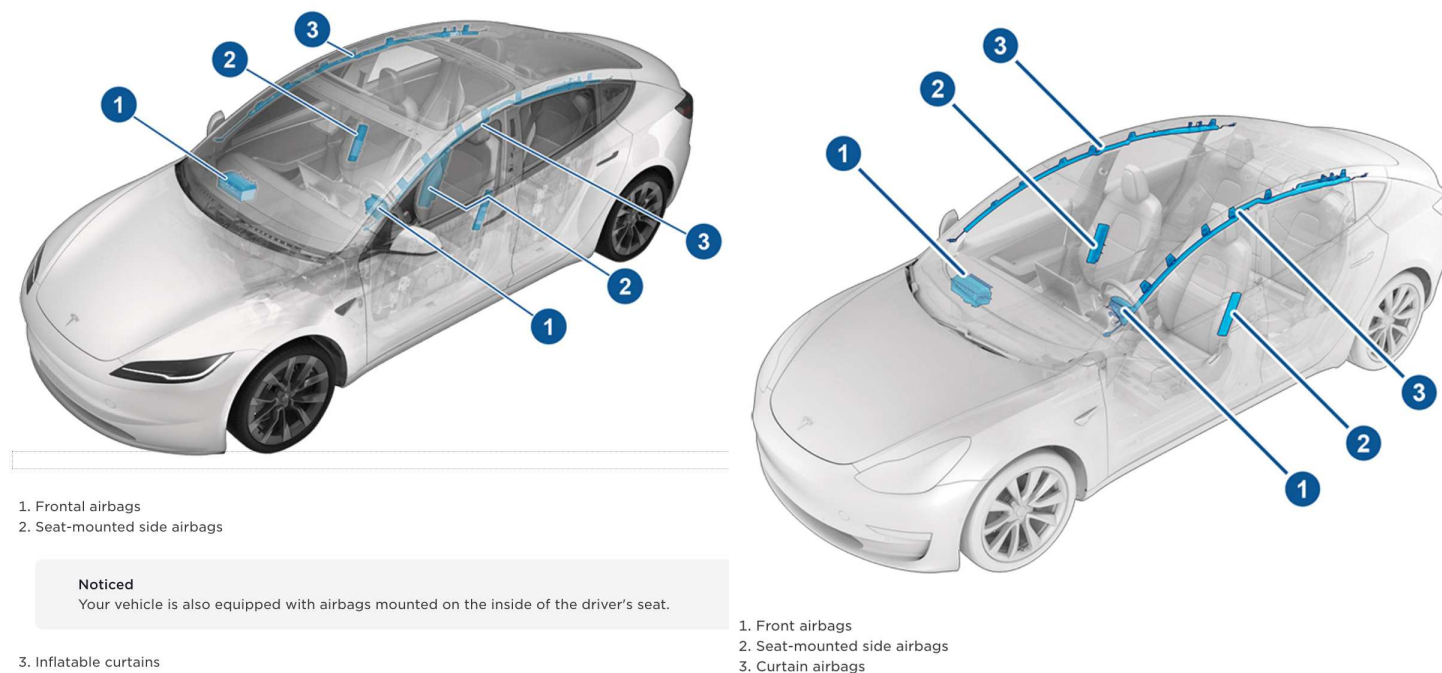
1. Knee airbag
2. Front airbags
3. Seat-mounted side airbags
4. Curtain airbags

Above: Airbags in the U.S./North America Tesla Model 3, according to the owner's manual. (Credit: Tesla)

In any case, it seems clear from the [U.S. owner's manual](#) (and those of other North American countries) that pre-refresh Model 3 builds include knee airbags. The new Model 3 design is not yet on

sale in the [United Kingdom](#), however, and you can see in their owner’s manual that the older European-shipped models also did not include a knee airbag.

It’s not clear as of yet whether the new Model 3 will include the knee airbags in the U.S. or other North American countries. Currently, there aren’t any markets with knee airbags in their owner’s manual.



Above: Tesla’s airbags in the 2024 Model 3 refresh (left; via French owners manual) compared to the pre-refresh Model 3 (right; via UK owner’s manual). (Credit: Tesla)

Still, it’s entirely possible that Tesla could remove the knee airbags in 2024 Model 3 builds in North America, especially if they aren’t deemed necessary. Capital-Pomegranate6 also points out that the European New Car Assessment Programme (EuroNCAP) conducts thorough [safety testing](#) of new cars. As such, Tesla could simply prioritize the inner driver’s seat airbag as more critical, especially if it still meets North American safety standards.

In 2019, the [Insurance Institute for Highway Safety \(IIHS\)](#) published an article stating that researchers found knee airbags could have “a negligible effect on injury risk,” even making injuries more likely in some cases. The accompanying [study](#) showed that knee airbags decreased injury risks from 7.9 percent to 7.4 percent in a real-world analysis. The 0.5-percent drop was “not statistically significant,” according to the [IIHS](#).

“There are many different design strategies for protecting against the kind of leg and foot injuries that knee airbags are meant to address,” said Becky Mueller, IIHS senior research engineer and co-author of the study. “Other options may be just as, if not more, effective.”

The IIHS also acknowledges that some manufacturers have continued building cars with knee airbags. Despite their potentially marginal effects, the organization adds that automakers could be using knee airbags to target high scores on federally mandated tests, and specifically those requiring dummies to be unbelted.

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