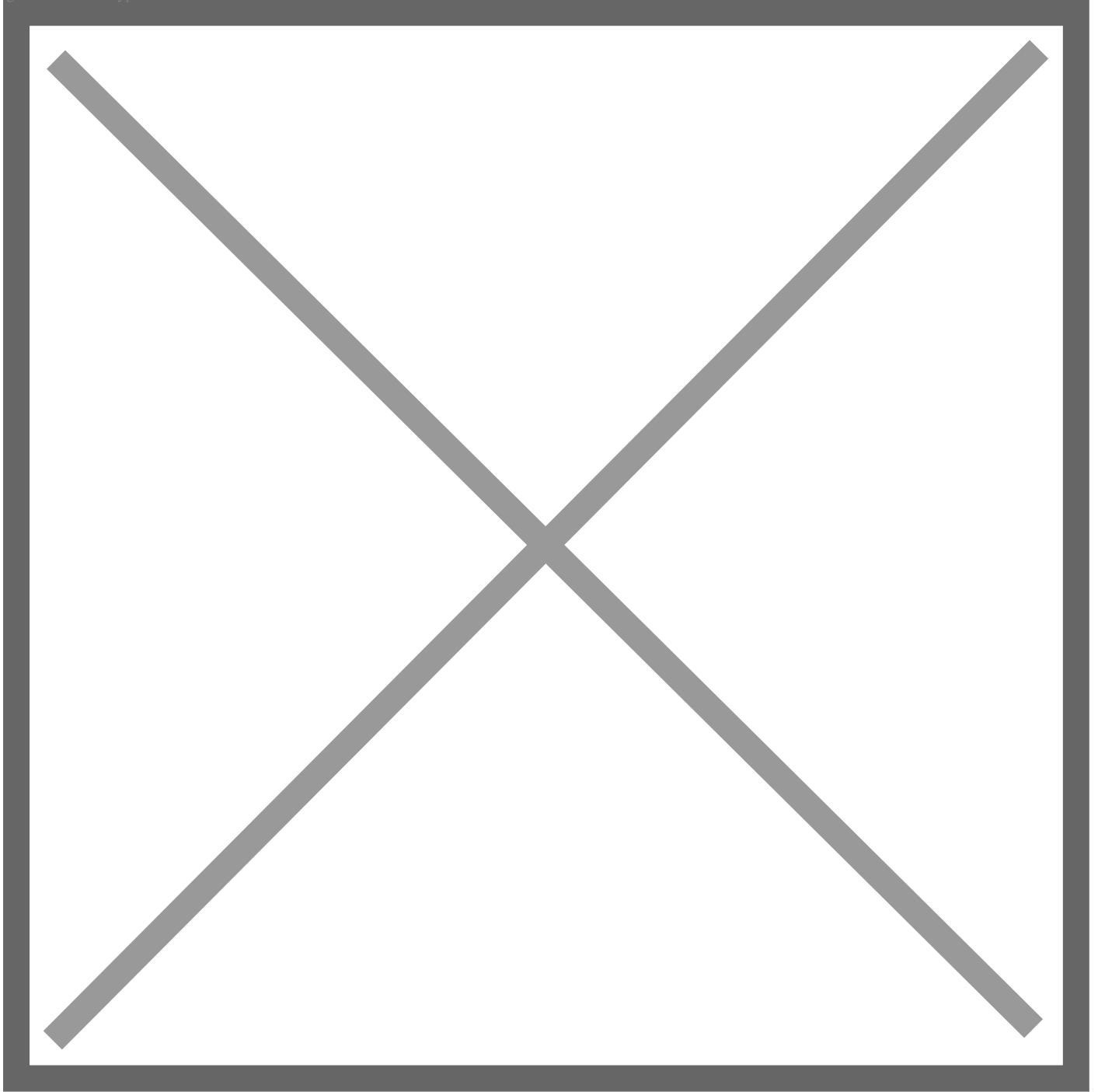


# Toyota is Offering Life-Saving Technology for Free

February 26, 2021

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When you hear that a company as big as Toyota is giving away something for free, it's normal to assume that it's something nobody wants.

Granted, in this case Toyota isn't giving away something that *everybody* wants, but it is offering up technology that's very important to engineers who work on improving how vehicles protect passengers in accidents.

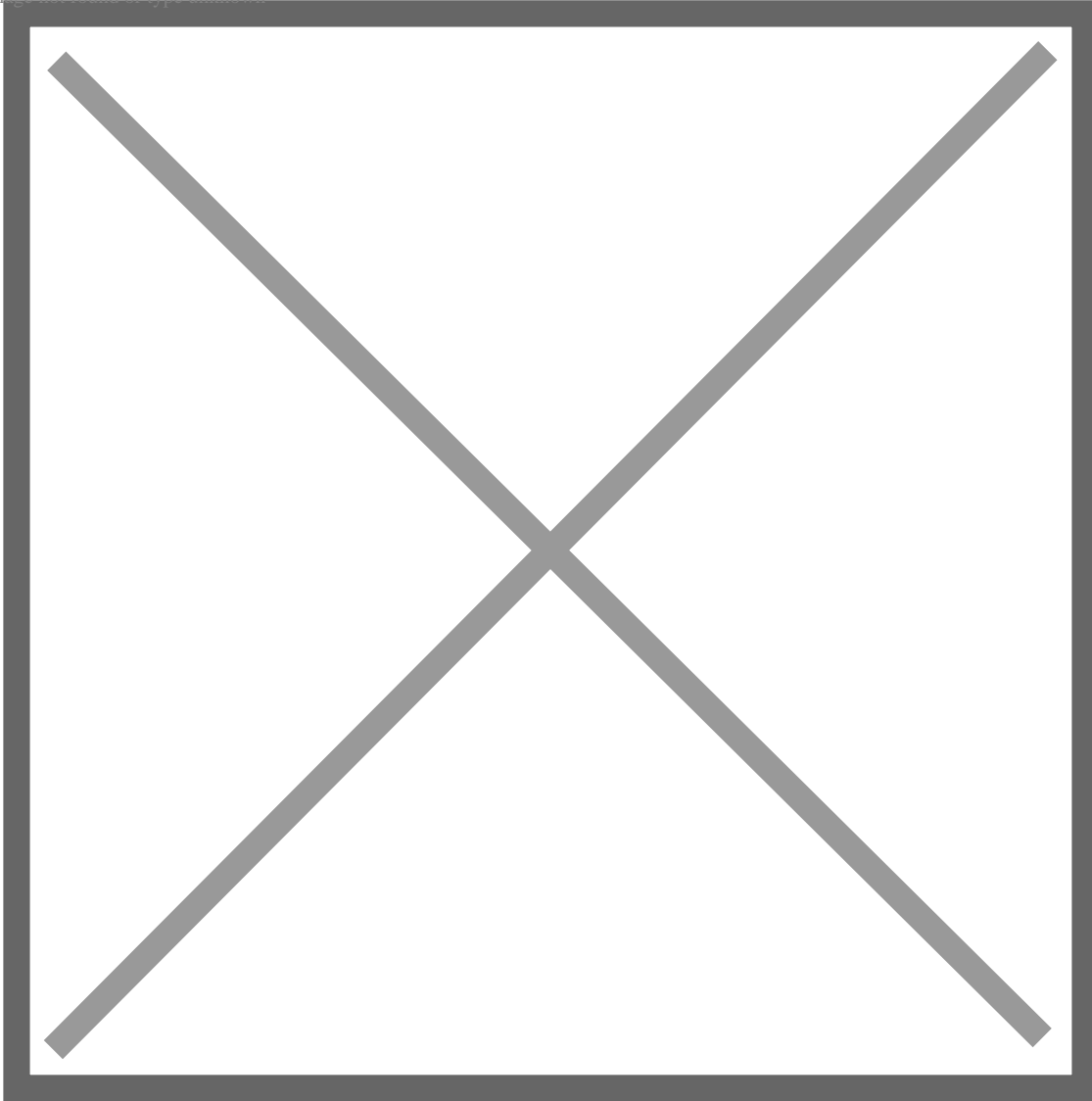
In this case, that technology is called the [Total Human Model for Safety](#), or THUMS for short. Think of it as a digital crash test dummy, one that includes almost all the bones, organs, tissues and tendons found in the human body. This makes it one of the most advanced systems available to simulate and analyze injuries caused in motor vehicle collisions.

It's the culmination of more than twenty years work by Toyota, and [as of January 2021](#), it's free to anyone who wants to use it.

### **THUMS Milestones**

- Beginning in the 1980s, automakers began to explore the potential for computers to simulate vehicle collisions.
- In the 1990s, Toyota Motor Corporation (Toyota) and Toyota Central R&D Labs began to collaborate on extending this simulation technology to the human occupants of a vehicle, developing a virtual model that could be used to simulate and calculate damage to the human body in a vehicle collision.
- In 2000, they launched Total Human Model for Safety (THUMS), the first virtual human body model software in the world that could simulate the entire body.
- Today, just as in 2000, THUMS is more than a piece of software. It represents a revolution in vehicle safety testing, helping to empower a human-centric focus that is designed to make cities, communities and infrastructure more sustainable by protecting the health and well-being of people.

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## **Putting THUMS to work**

Toyota launched THUMS Version One in the year 2000 and has followed with six more versions that evolve and broaden the model's scope. This includes expanding it to consider different factors, including gender, age, differences in physique, brains, internal organs and muscles.

Over the years, the technology has repeatedly helped to engineer improved systems to protect occupant safety. One of its first uses was to help reduce injuries associated with whiplash, which occurs when a person's head quickly moves backward and then forward, most often following a rear-end collision.

Later, as THUMS expanded to include models of different body types, the system was used to study whether it was safe for pregnant women to wear seatbelts. At the time, some in the industry questioned whether pregnant women should wear them, worrying that the belt would hurt the fetus in a crash.

To answer the question, engineers developed a THUMS model of a pregnant woman, visiting an obstetrics and gynecology hospital, talking to doctors, and reading many technical documents on pregnant women and fetuses. Toyota presented this research at an automotive academic conference, which led to the revision of traffic rules

and a broad acceptance that carrying mothers should wear seatbelts.

### **Toward a safe mobility society**

THUMS was created to help Toyota spur the development of improved passive vehicle safety systems, and ultimately to move towards a safe, inclusive, mobile society. Today, the system is used in vehicle safety research by over 100 vehicle manufacturers, suppliers, universities, and research institutions, among others.

Looking ahead, the system also holds significant promise in testing vehicle safety for new categories of mobility, including highly-automated vehicles that may have different seating configurations than traditional cars and trucks.