# F1 driver seat 'avatar' has potential to improve comfort and performance

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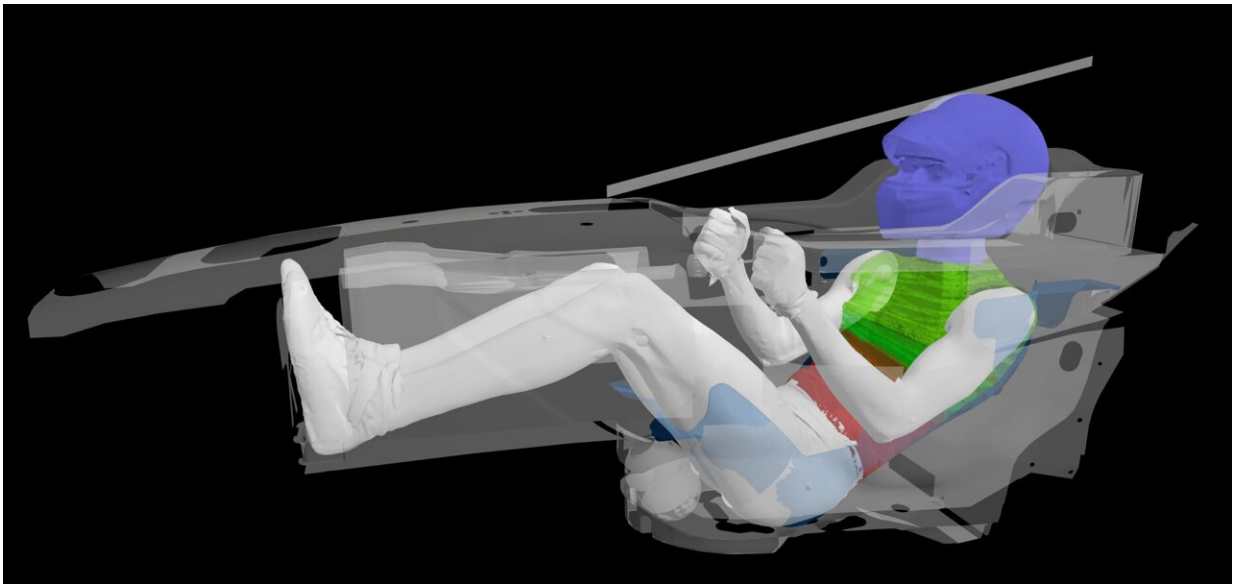

Credit: University of Portsmouth

A pilot project has revolutionized the way Formula 1 racing seats can be designed using biomechanics technology, in an effort to improve a driver's comfort and performance.

Williams Racing engineers have partnered with experts from the University of Portsmouth on a study to develop a more detailed understanding of how a driver physically fits in a car. The goal was to support race seat construction and improve fit ergonomics.

Currently, the most common industry approach for producing a custom race seat relies on a labor intensive, highly subjective process that has not developed over the past two decades. It often leads to the seat being made multiple times until a driver is happy, because of difficulties observing their position and time constraints.

Researchers from the University's School of Sport, Health and Exercise Science have introduced scientific methods to the process and created a digital "avatar" of Williams driver Nicholas Latifi to simulate his seated position. They did this by building a musculoskeletal model using 3D scanning in computer aided design (CAD) software.

Dr. Emma Neupert, senior lecturer in physiology at the University of Portsmouth, said, "We began this project because we believed we could improve the current methods for seat fits, improve a driver's comfort and also look at the health and safety side of things.

"We're really pleased with the results of the pilot, which has successfully shown that an end-to-end digital seat fit process is possible, using this new innovative approach."

Latifi added, "For me personally, the fit and comfort in the driver's seat is probably one of the most important things. If you're moving around in the seat too much or you're simply not comfortable, then it's going to affect how you drive and how you give feedback to the team."

The digital driver fit allows the team to see the "real" driver in CAD via a customized model. It has the potential to minimize the need for repeated seat fittings, lower the cost to the team, and reduce the forces on the musculoskeletal system of the driver.

Philippa Morris, senior design engineer at Williams Racing, said, "If our driver isn't comfortable in the cockpit it can understandably impact their

overall performance. Sometimes we will go through multiple race events before we have a seat that they are happy with.

"That's why we wanted to find a way to ensure the seat construction is as accurate and efficient as possible. By digitizing the process, we have been able to make adjustments to the seat that are anatomically correct, and while there's still a few things to iron out, the initial data is really promising."

Dr. Chris Mills, senior lecturer in biomechanics at the University of Portsmouth, said, "This project has the potential to impact safety by allowing us to look at what the driver's musculoskeletal system is doing. We can quantify the forces acting on the driver and within the driver's spine and muscles. In the future we also hope to understand more about how the seating position affects forces on the driver with the aim to minimize injury risk."

Dr. Neupert added, "In terms of where we're going to go from here, there are still a few areas to refine but given that Nicolas got in the car and said [he] feels that the seat is made for [him], that's really positive."

Provided by University of Portsmouth

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