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Vintage racecars reveal new insights into man and machine

Stanford researchers are using modern sensors to discover the secrets of how antique sports cars handle, to help build the cars of the future.

BY STEVE FYFFE

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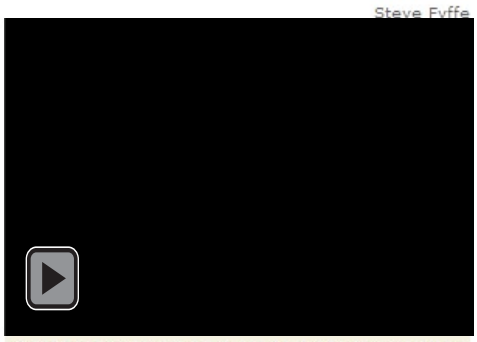


Stanford researchers are using modern sensors to discover the secrets of how antique sports cars handle and to help build the cars of the future.

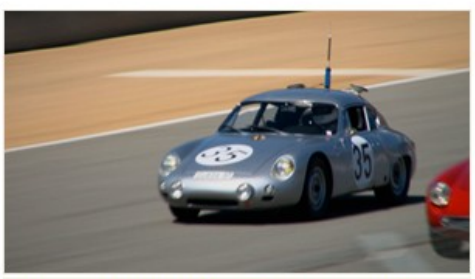
It's a Saturday morning at the famous Laguna Seca Raceway in Monterey. In a back-to-the-future moment, an interdisciplinary team of Stanford researchers is wiring up vintage racecars (and their drivers) with sensors, as part of an effort to create the car of the future.

"The long-term goal is to gather data from the greatest cars ever made, and also some of the crummiest cars ever made, to understand what makes great cars great and crummy cars crummy," says communication Professor Cliff Nass, director of the newly established Revs Program at Stanford.

The first car being prepped for the track is a 1960 Porsche 356B Carrera Abarth GTL, on loan from philanthropist Miles Collier's collection of more than 100 classic cars.

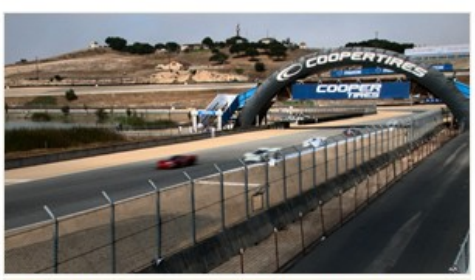
"Ours is the first one made, serial number 1001," says Collier, who also provided the founding gift that established the Revs Program.

"Being the first car, it was the one that put that particular racing model on the map for Porsche, and it won its class in every race it raced in for Porsche in 1960."



An interdisciplinary team wired up this vintage Porsche race car and its drivers with sensors to measure the car's performance around the Laguna Seca Raceway, and the driver's second-by-second physiological reactions to the challenging course.

A team from Stanford's Department of Mechanical Engineering has attached a wide range of sensors to the Porsche, including GPS antennas, a radio link, laser sensors, suspension sensors, accelerometers and gyroscopes.



The Stanford team raced the Porsche, on loan from the Collier Collection, against other classic cars at the world-famous Laguna Seca Raceway.

"We're able to measure its position on the track to within about 1 to 2 centimeters, as well as all the accelerations, the movement of the suspension, the rotation of the tires and all of the driver's commands – steering wheel, throttle, brakes," says mechanical engineering Associate Professor Chris Gerdes, program director of the Center for Automotive Research at Stanford.

Nass' team is connecting the driver to sensors that will monitor his body's reactions second-by-second as he races the course. He'll be competing against other classic racing cars, as part of a vintage car rally held here every year.

The driver's sweat, core temperature, heart rate and blood volume will all be recorded, and cross-referenced with mechanical data gathered from the car. Nass plans also to monitor the driver's brain activity in future tests.

"At each instant we can not only know all the different things the car is doing, we can know all the things the driver's body is doing, with the goal of understanding how cars create feelings and emotions in drivers," Nass says.

Gerdes hopes the data will help his team create advanced safety devices for future cars.

"We really want to understand how the car is responding to the driver, and how the driver is responding to the car," he says.

He also hopes it will improve the performance of Stanford's autonomous car, an Audi TTS known as Shelley. Artificial intelligence technology in the trunk allows the car to drive itself, using the standard electronic steering, brake and throttle controls, while keeping track of its position with GPS and a detailed map of the course.

"What we're interested in here is understanding how do the calculations of our autonomous car compare to very skilled drivers," Gerdes says.

"Do skilled drivers have an advantage because of their ability to adapt to conditions? Or does the autonomous vehicle have an advantage because of the ability to reproduce things exactly every time and have a much more precise understanding of where it is on the track at any given moment?"

Nass says the Revs Program plans to conduct similar tests with many more of the vintage cars from Collier's collection, as well as some modern models. All the data will be cataloged and given to the university library.

"Eventually we will have a corpus, a set of every single car and driver, to be able to answer the question, 'How do cars and drivers interact in the most compelling ways?'" says Nass.

Collier says doing this kind of research is not only useful, it's also plain old-fashioned fun.

"What is more exciting, if you like cars, than racing cars, with their overtones of power and danger and excitement," says Collier.