Autonomous Cars vs. Racecar Drivers

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**ABSTRACT:** Automated vehicles can potentially improve the safety of the average driver in emergency situations. Many accidents occur because the car has reached the limits of its capability such as in hazardous weather conditions. Professional racecar drivers routinely operate at the limits of handling to win races, so a unique way to provide safety systems for future automated vehicles is to emulate the skills of professional drivers. The presentation will discuss how a family of simple curves can be used to create trajectories that incorporate professional driving techniques. Experimental results of the resulting trajectory were implemented on an automated vehicle demonstrating performance that surpasses the average driver. This path planning structure offers an approach that can be generalized to many different safety critical situations.

**Bio:** Paul Theodosis is a research engineer at Ford Motor Company working on the autonomous car project. He recently completed his PhD at Stanford University in the mechanical engineering department. His research centers on path planning at the limits of handling, dynamic modeling to problems in nonlinear control, estimation and diagnostics. He was part of the autonomous Audi TTs project that raced up Pikes Peak in 2010. He also tested the autonomous Audi at Thunderhill Raceway Park in Willows, CA where the car has recently beaten skilled racecar drivers that compete in local events. At this racetrack, he worked on improving the car’s lap time to beat the best human drivers and developing real-time trajectory modification to avoid danger. The results presented came from the Dynamic Design Lab at Stanford with Chris Gerdes as his advisor.