Distinguished Lecture

Friday, March 30 **1 p.m.** **3043 ECpE Building Addition**

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Reliably Accurate State Estimation for Autonomous Highway Vehicles

ABSTRACT: Accurate and reliable awareness of world interactions is a key requirement for effective commercial deployment of autonomous and connected vehicles. Awareness arises from onboard sensors and ubiquitous communication between vehicles and infrastructure. Vehicle coordination and safety necessitate reliable "where-in-lane" knowledge of vehicle position. This presentation will address sensor fusion for high-bandwidth vehicle state estimation with a focus on high accuracy and reliability. Advances is sensing and computation have dramatically altered the focus of related research. The large number of measurements provides both opportunities (e.g., high accuracy) and challenges (e.g., large numbers of outliers). Standard state estimation approaches that decide irrevocably at each time which measurements are valid (e.g. EKF) are not sufficiently reliable at removing the effects of spurious measurements. When that decision is wrong, either measurement information is lost or the state and covariance estimates become corrupted, rendering all subsequent decisions suspect. Either situation can result divergence of the state estimate. Alternative new approaches extract the Bayesian optimal trajectory using a temporal window of sensor data while minimizing risk subject to accuracy constraints. Such approaches are able to evaluate and reconsider outlier assumptions for all measurements within the temporal window.

BIO: Jay A. Farrell is a Professor in the Department of Electrical and Computer Engineering at the University of California, Riverside. His research focuses on state estimation, control, and planning for nonlinear systems, particularly autonomous vehicles. He served the IEEE Control Systems Society (CSS) as Finance Chair for three IEEE CDC`s, on the Board of Governors for two terms, as Vice President Finance and Vice President of Technical Activities, as General Chair of IEEE CDC 2012, and as President in 2014. In 2018, he will serve as Vice President of the American Automatic Control Council. He was a GPS World Magazine GNSS Leader to Watch for 2009-2010 and a winner of the U.S. Department of Transportation`s Connected Vehicle Technology Challenge in 2011. He is author of over 250 technical publications and three books, a Distinguished Member of IEEE CSS, a Fellow of AAAS, and a Fellow of the IEEE.

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