

# VILLANOVA UNIVERSITY



## MECHANICAL ENGINEERING DEPARTMENT

### Spring 2020 SEMINAR SERIES

**Seminar Date:** January 31, 2020

**Lecture:** Energy and Motion Control of Autonomous Electric Vehicles

**Speaker:** Ricardo Jorge Pinto de Castro  
Institute of System Dynamics and Control

#### **Abstract:**

Energy storage is one of the key systems necessary for electric mobility and zero-emission vehicles. Batteries, currently the dominant technology in vehicular energy storage, are prone to capacity, thermal, and aging imbalances in their cells, all of which limit power delivery to the vehicle. In the first part of my talk, I will introduce a way to tackle these challenges using a new class of battery balancing systems--called "hybrid battery balancing"--that simultaneously provides capacity and thermal equalization while enabling hybridization with additional storage systems, such as supercapacitors. I will present experimental results that demonstrate how this new concept can significantly decrease energy losses and battery stress while increasing a vehicle's range when compared to conventional balancing methods.

#### **Biography:**



Ricardo de Castro received the Licenciatura (in 2006) and Ph.D. (in 2013) in Electrical and Computer Engineering from the University of Porto in Portugal. From 2007 to 2008 he was an entrepreneur with the We Move U project, targeting the development of powertrain control solutions for lightweight electric vehicles. Since 2013, he has been with the German Aerospace Center (DLR), Institute of System Dynamics and Control (SR), where he is developing enabling technologies for electric mobility and autonomous driving. Ricardo de Castro has been Editor of IEEE Transactions on Vehicular Technology, Associate Editor of IEEE Access, Guest Editor of the journal Energies, and chair of the IEEE Automated Vehicles Standards Committee. He is also a Senior Member of the IEEE, the author of three patents, more than 60 papers in international journals, conferences and book chapters, and recipient of two best paper awards.

