XiL Rapid Controls Development through Simulation of an Electrified Vehicle with AVL CRUISE M Physics-Based Models

SPEAKERS

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About The Speaker:

Michael Bambula works at AVL within the Advanced Simulation Technologies division. He supports modeling and simulation topics for enterprise customers in North America. He started his career at Cummins, developing physics models for XiL application to support advanced controls development.

He also has an interest in Motorsports in a technical capacity. IMichael graduated from UCF with a specialty in Energy Systems(Heat Transfer, Thermodynamics, Fluid Mechanics) in 2015 and participated heavily in Formula SAE.

ABSTRACT

With the increase of electrification in the mobility segment, it has become increasingly important to reduce the time to market for a given vehicle. One way to do this is to save time and effort on the engineering of the vehicle. With the increased interaction of the E-Axle, Battery, and Thermal Management System to impact energy range/performance, there seems to be an almost infinite possibility of controls/software development paths. Testing all of these on a real vehicle will be time consuming and costly. Prototyping these algorithms on data or through a fundamentals approach might also not lead to an ideal. Using a physics-based system model of the electric vehicle allows controls and software engineers to test their strategies in closed-loop on a virtual model that responds realistically and has low cost and runs faster than a real vehicle test. It also opens the door to parallelize these analysis to determine controls robustness and minimize the variance of range/performance during edge-case operation. In this course we will teach the audience how to set up an electric vehicle from the Battery Modeling to the Motor Modeling to the Inverter Model and Thermal System and finally we will package the model to run in an XiL workflow for controls and algorithm prototyping.