World Academy of Science, Engineering and Technology
International Journal of Transport and Vehicle Engineering
Vol:13, No:02, 2019

Energy Benefits of Urban Platooning with Self-Driving Vehicles

Authors : Eduardo F. Mello, Peter H. Bauer

Abstract : The primary focus of this paper is the generation of energy-optimal speed trajectories for heterogeneous electric vehicle platoons in urban driving conditions. Optimal speed trajectories are generated for individual vehicles and for an entire platoon under the assumption that they can be executed without errors, as would be the case for self-driving vehicles. It is then shown that the optimization for the “average vehicle in the platoon” generates similar transportation energy savings to optimizing speed trajectories for each vehicle individually. The introduced approach only requires the lead vehicle to run the optimization software while the remaining vehicles are only required to have adaptive cruise control capability. The achieved energy savings are typically between 30% and 50% for stop-to-stop segments in cities. The prime motivation of urban platooning comes from the fact that urban platoons efficiently utilize the available space and the minimization of transportation energy in cities is important for many reasons, i.e., for environmental, power, and range considerations.

Keywords : electric vehicles, energy efficiency, optimization, platooning, self-driving vehicles, urban traffic
Conference Title : ICSDCTA 2019 : International Conference on Self-Driving Car Technologies and Applications
Conference Location : Buenos Aires, Argentina
Conference Dates : February 27-28, 2019