

Optimization of a Two-Speed Differential for an All-Wheel Drive Battery Electric Vehicle

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Abstract : This research is conducted to improve the efficiency and effectiveness of the propulsion control system of the EcoCAR EV Challenge Cadillac LYRIQ. The competition is meant to teach students at colleges and universities to develop strategies and experiences useful in industry. The propulsion system being analyzed contains a shifting differential mechanically connected to the front motor of a dual-motor all-wheel drive system. The primary analyses of this system are a shift control strategy for the front axle propulsion system and a torque split scheme between the front axle and rear axle systems. The results of this research will make the system being developed by the team more effective and more competitive for the EV challenge. This rise in electric vehicle adoption and use in the consumer market has driven the development and research of strategies similar to those analyzed in this work and will continue into the future as electric vehicles are more widely used.

Keywords : efficiency map, shift strategy, torque split, battery electric vehicle

Conference Title : ICCASE 2025 : International Conference on Control, Automation and Systems Engineering

Conference Location : Miami, United States

Conference Dates : March 10-11, 2025