Design and Development of the 2002 Michigan Tech Futuretruck, a Parallel Hybrid Electric Vehicle

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Abstract:
In this paper, the conversion of a production sport utility vehicle (SUV) to a hybrid electric vehicle utilizing a through-the-road parallel hybrid configuration is presented. The uniqueness of this design comes from its ability to decouple the front and rear drivetrain to simplify the packaging of underbody components. The Hybrid Theory utilizes a 2.0L, 4-cylinder engine that supplies 101 kW (135 hp) to the front wheels and a DC motor that supplies an additional 53 kW (70 hp) to the rear wheels to achieve the competition goals of a 25% improvement in fuel economy, a reduction in Green House Gas (GHG) emissions, as well as maintaining stock performance. The effects on drivability, manufacturing, fuel economy, emissions, and performance are presented along with the design, selection, and implementation of all of the vehicle conversion components. The result is a simple, low-cost option that increases the environmental friendliness that customers expect without compromising the performance they demand.