

Control and Integration of a Fuel-Cell Powered Wheelchair

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Abstract

This paper proposes a fuel-cell powered wheelchair. As an alternative energy source, fuel-cell has drawn much attention and research. To improve mobility for people with walking disability, we combine a fuel cell module with two battery sets to provide long-lasting power for an electrical wheelchair. The study is carried out in three steps: the fuel-cell control, power management, and system integration. First, we apply multivariable robust control strategies to regulate the hydrogen and air flow rates of a proton exchange membrane fuel cell module, which provides steady electrical power for the system. Second, we design a serial power-train, where the fuel-cell charges two Lithium Iron battery sets which in turns drive the wheelchair's motors. Lastly, the aforementioned subsystems are integrated for experimental verification. The results demonstrate the effectiveness of the proposed system.