Simulation-Based Framework Analysis of Electric Vehicle System and Retrofitting of Electric Motorcycle

Vinaya Dodake, Shriram Kakde, Parth Shete, Diksha Kamble, Dr. S. S. Shingare
Department of Electrical Engineering
AISSMS Institute of Information Technology, Pune India
vinayadodake@gmail.com, shriramkakde2002@gmail.com, sheteparth1@gmail.com
saurabh.shingare@aissmsioit.org, kamblediksha775@gmail.com

Abstract: *The simulation-based analysis of a brushless DC (BLDC) motor system for electric vehicle applications is presented in this paper. With MATLAB Simulink and Simscape Electrical as models, the paper focuses more on software and design elements. A 72V battery pack, a three-phase inverter that powers the BLDC motor, and a buck converter for voltage control are all integrated into the system. A cascade control architecture with proportional-integral (PI) controllers regulates speed and voltage, targeting precise operation. Rotor speed analysis. The battery state of charge (SOC) exhibits a non-linear decrease, reflecting voltage-based estimation limitations compared to ideal linear discharge. Power electronics design for the charger is supported by EASYEDA PCB Design software. The study underscores the need for optimized PI tuning and advanced SOC estimation to enhance system reliability*

Keywords: DC (BLDC)