Electric vehicle power and signal multiplexing using cascaded inverters

Publisher: IEEE

N.V. Kishore Kumar ; N. Jayanthi ; C.S. Chaithanya ; C. Kalyankumar ; D. Harika ; G. Sravani All Authors

Abstract: Transmission of communication signals across power electronic circuits is the focus of power & signal multiplex transmission (P&SMT). The electric motor, vehicle dynamics... **View more**

Metadata

Abstract:
Transmission of communication signals across power electronic circuits is the focus of power & signal multiplex transmission (P&SMT). The electric motor, vehicle dynamics, and their respective controls are all part of the proposed model. Differential equations are used to explain the mathematical model of the DC/DC buck-boost converter when it is in both the boost and buck zones of operation. The proportional-integral regulator is used in the development and implementation of the control system. The typical electric vehicle (EV) communication system is more expensive to wire than the one suggested here since the proposed technique allows communication signals to be transmitted without requiring a Controller Area Network bus. In EVs, the proposed system can control motor speed while also draining the battery in a balanced manner. In a Matlab/Simulink simulation, both power and communication signals may be conveyed using a pulse width modulation technique and a frequency shift keying approach. The suggested system's maximum signal rate is 600 bit/s, as estimated by calculating the bit error rate of the sent signal.

Published in: 2022 Second International Conference on Advanced Technologies in Intelligent Control, Environment, Computing & Communication Engineering (ICATIECE)

Date of Conference: 16-17 December 2022

INSPEC Accession Number: 22683716

Date Added to IEEE *Xplore*: 24 February 2023

DOI: 10.1109/ICATIECE56365.2022.10046844

ISBN Information:

Publisher: IEEE

Conference Location: Bangalore, India

N.V. Kishore Kumar
Department of EEE, Mother Theresa Institute of Engineering and Technology, A.P

N. Jayanthi
Department of EEE, Mother Theresa Institute of Engineering and Technology, A.P

C.S. Chaithanya
Department of EEE, Mother Theresa Institute of Engineering and Technology, A.P

C. Kalyankumar
Department of EEE, Mother Theresa Institute of Engineering and Technology, A.P

D. Harika
Department of EEE, Mother Theresa Institute of Engineering and Technology, A.P

G. Sravani
Department of EEE, Mother Theresa Institute of Engineering and Technology, A.P

Contents

Due to climate change's concerns, scientists and researchers are looking at fossil fuel alternatives in order to lower carbon dioxide emissions. One practical approach to lowering emissions and saving money in the automotive sector today is the use of electric cars. Electric vehicles (EVs) not only reduce noise pollution but also reduce emissions of harmful gases including carbon monoxide and nitrogen oxide [1]. In addition, charging an EV's battery at night helps the grid maintain a more stable load and lower overall costs since it occurs outside of the peak demand period [2]. It is important to use an efficient technique to realise signals transfer [3] between the transmission control unit (TCU) and other subsystems in an EV, such as the motor control unit (MCU) and battery management system (BMS). Because of its high reliability and high transmission baud rate, the Controller Area Network (CAN) bus is one approach that is commonly recognised by both manufacturers and researchers as being suitable for usage in EVs for the purpose of data transfer [4]. Fig. 1.

Electric vehicle powertrain

Authors

N.V. Kishore Kumar
Department of EEE, Mother Theresa Institute of Engineering and Technology, A.P

N. Jayanthi
Department of EEE, Mother Theresa Institute of Engineering and Technology, A.P

C.S. Chaithanya
Department of EEE, Mother Theresa Institute of Engineering and Technology, A.P

C. Kalyankumar
Department of EEE, Mother Theresa Institute of Engineering and Technology, A.P

D. Harika
Department of EEE, Mother Theresa Institute of Engineering and Technology, A.P

G. Sravani
Department of EEE, Mother Theresa Institute of Engineering and Technology, A.P

Figures

References

Keywords

Metrics

More Like This

A novel self oscillating power electronics for contactless energy transfer and frequency shift keying modulation
2016 International Symposium on Power Electronics, Electrical Drives, Automation and Motion (SPEEDAM)
Published: 2016

A novel pure digital signal processing noncoherent receiver based on filter bank realization for frequency shift keying
Proceedings of ICUPC '95 - 4th IEEE International Conference on Universal Personal Communications
Published: 1995

Show More