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Notice for the PhD Viva-Voce Examination

Ms Indu K (Registration Number: 1882001), PhD scholar at the School of Engineering and Technology, CHRIST (Deemed to be University), Bangalore will defend her PhD thesis at the public viva-voce examination on Saturday, 10 August 2024 at 10.00 am in the CDI Conference Room, III Floor, Block V, Bangalore Kengeri Campus, Bengaluru 560074.

Title of the Thesis	:	**Design, Analysis and Validation of Electric Vehicle Control and Safety for Different Path Profiles and Braking Conditions**
Discipline	:	**Electronics and Communication Engineering**
External Examiner (Outside Karnataka)	:	**Dr Suresh Babu Perli** Associate Professor Department of Electrical Engineering National Institute of Technology, Warangal Telangana - 506004
External Examiner (Within Karnataka)	:	**Dr Kanthi M** Professor Department of Electronics and Communication Engineering, Manipal Institute of Technology Manipal Karnataka - 576104
Supervisor	:	**Dr Aswatha Kumar M** Professor (Former) Department of Electronics and Communication Engineering School of Engineering and Technology CHRIST (Deemed to be University) Bengaluru -560074 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva-voce examination.

Registrar

Place: Bengaluru
Date: 31 July 2024

ABSTRACT

Energy conservation and Environmental pollution are two major challenges today for our society. Currently, utilization of the latest technology, to reduce energy consumption and harmful emissions from vehicles, is gaining significance in the contexts related to automobile, energy and power industries. Considerations of these contexts enable us to form a more realistic perspective and a need for developing fuel efficient, comfortable and affordable electric vehicles. The importance of design and development of electric vehicle (EV) is better perceived when we realise that, there is a major impact on our future society due to (i) the energy saving aspect from both the customer side on individual expenditure as well as from the national economy viewpoint and (ii) the huge benefit due to reduction of emissions from internal combustion engines using fossil fuels. EV offers the best solution which not only avoids emissions but overcome the dependency on petroleum resources as well. Due to fewer moving parts, monitoring and controlling of EV are also smooth and relatively much easier. The embedded control techniques used in EV also contribute for a better controllable, observable, predictable and efficient vehicle drive. This current research work focuses mainly on Electric Vehicle Mobility and Control aspects for a deeper study.

This research work addresses topics related to mathematical modelling and simulation studies for design and analysis of EV control and safety. Validations of the several case studies done during this research are supported by software tools namely MATLAB/Simulink and IPG Carmaker Virtual Driving Simulation Platform. Starting from modelling onwards, throughout the various stages of this work, realistic vehicle parameters and specifications are considered. The different levels of testing, validation and trial runs of the model-based designs are also validated by software in loop and hardware in loop approaches. Automotive Safety Integrity Level B/C hardware was used for the implementation purpose. This work concludes with a feasible benchmark on performance analysis of braking control strategy for vehicle safety subsystems.

Keywords: Electric Vehicle, Electronic Control Unit, Simulation, IPG Carmaker, Hardware in Loop

Publications:

1. **K. Indu** and M. Aswatha Kumar., "Electric Vehicle Control and Driving Safety Systems - A Review", IETE Journal of Research, Vol. 69, No. 1, pp. 482-498.
2. **Indu, K.** and Aswatha Kumar, M., "Simulations of Electric Vehicle Model for Insights into Pre-Planned Trajectory Profiles", International Journal of Control and Automation Vol. 13, No. 02, pp. 677 – 686.
3. **K. Indu** and Aswatha Kumar M., "Analysing the Performance of Braking System in an Electric Vehicle using Fuzzy Neural Networks", Sustainable Energy, Grids and Networks, Vol. 36, pp. 101215
4. **K. Indu** and M. Aswatha Kumar., "Learning Techniques for Societal Utility Electronics - A Futuristic Survey", In Proc. of International Conference on Data Science- IConDSC-2019, Jan 2019, Christ University.
5. **Indu, K.** and Aswatha Kumar, M., "A Fundamental Study on Electric Vehicle Model for Longitudinal Control", International Symposium on Control, Communication and Embedded System for Robotics, SOCCER 2020, 03-04 October 2020, NIT Silchar, India.
6. **Indu, K.** and Aswatha Kumar, M., "Impact of Inclination of Path Profiles on the Performance of Electric Vehicles" International Conference on Intelligent Communication, Control and Devices, ICICCD 2020, 27-28 November 2020, University of Petroleum & Energy Studies, Dehradun.
7. **Indu, K.** and Aswatha Kumar,.M., "Electric Vehicle Research: Need, Opportunities and Challenges", Handbook of Sustainable Development Through Green Engineering and Technology, pp. 171-191