

# Simulated and Experimental Analysis of Different Batteries for Light Weight Electric Vehicle

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**Abstract:** The increasing demand of efficient solution for automobile sector due to rise in petroleum prices, its harmful effects on environment, The Electric mobility contributing to greater extent to balance the energy and power demands, energy storage units as well as environment safety. Electric vehicle has major efficient features of zero combustion, longer charging and discharging cycle which plays a vital role to replace the ongoing increase in price of petroleum fuels and its harmful effect on environment with their degrading store. Many non-conventional energy sources like solar, tidal, wind etc. Can be used to generate energy and store it in suitable types of batteries to run these vehicles. The Different types of batteries like lead acid, lithium ion, nickel bromide is used as an energy storage device for these electric vehicles. But with many advantages these batteries have some structural and thermal issues if not designed or connected properly. These issues are capacity loss, cell balancing, thermal runaway, reduction in battery life etc. Therefore, much focus needs to give on proper battery connections, selection of battery for specific application considering its working parameters. Possible types of connections for batteries are active, passive and semi active as per their connections in series and parallel type. For series combinations apposite terminals of batteries are connected to each other, in which current remains constant and battery voltage is summed up to increase for maintaining the same capacity or ampere hour (Ah) rating of batteries. Whereas in parallel connections same terminals of the batteries are connected to each other in which voltage remained constant and battery current is summed up to rise. This is needed when we need to double the battery capacity or ampere hours (Ah) rating according to your system needs while maintain the same level of voltages. The present work focused on Virtual modelling and design optimization of electric vehicle selecting suitable load (BLDC motor) using simulation in MATLAB/ Simulink with different types of batteries to know the variation of battery parameters like SOC, current, temperature and voltage etc. as per time, evaluating the displacement covered and velocity. Then its validation through experimental set up by analyzing the battery behavior of light weight vehicle.

**Keywords:** Self Charging Electric Cycle, Simulink, Paddling, Lithium-ion Batteries, Lead Acid Batteries, etc.

## REFERENCES

- [1] Ravikant K. Nanwatkar, Dr. Deepak S. Watvisave, "Analysis and Simulation of Hybrid Energy Storage System for Electric Vehicle" in July 2021| IJIRT | Volume 8 Issue 2 | ISSN: 2349-6002.
- [2] Hampus Ekblad, Ase Svensson & Till Koglin, literature of how different parameters are associated with bicycle planning.
- [3] Gicky Jose Malppan, Tom Sunny Aug, Design and Development in bicycle.
- [4] Akshay N. Chakole, Vishal A. Dhotre, P. V. Raut, Generation of electricity using Dynamo.

- [5] Rajesh Kannan Megalingam, Pranav Sreedharan Veliyara, Raghavendra Murali Prabhu, Rocky Katoch 2012 Generation of power with the help of bicycle paddling.
- [6] Chien-Cheng Lin, Song-Jeng Huang, Chi-Chia Liu 2017 Development And optimization of frames of bicycles.
- [7] Rupesh H. Patil, Mrunalini E. Raut, Harshada R. Zunjarrao, Ashish B. Padwal Feb, 2019 Development in fabrication for EBicycle.
- [8] Tina Nielsen Sadie Mae Palmatier Abraham Proffitt Recreation conflict focused on emerging E-Bike technology.
- [9] Hardik Keshan, Jesse Thornburg and Taha Selim Ustun Jan, 2016 Comparison of Lithium-ion and Lead-Acid batteries.
- [10] C Iclodean1, B Varga, N Burnete, D Cimerdean, B Jurchias 2017 Comparison of various batteries for E-Bicycle.
- [11] S Manish Yadav, Ajey Kumar Thakur, Mohd. Adil, Rahul kumar Arun Naithani. Dhruv Kumar, Ashutosh April, 2018 Importance of human powers and alternative energy source is investigated.
- [12] Md. Rezwanul Kabir, Mohammad Ashabul Haque, Tawsif Rahman Dec, 2011 Pedal powered generator used for power generation.
- [13] B. Sneha, Dr. M. Damodar Reddy Oct, 2015 Easy way of generating power at small levels.
- [14] M. Jawahar, G. Venkanna, B. Sandeep Dec, 2014 Design and construction of pedal operated water pump.
- [15] Markus Lutz 2011 Design and development of electric vehicle and its advantages.
- [16] Mitesh Dodiya, Ashish Modi, Sandip Mokariya, Nishan Panchal 2015-2016 Self rechargeable electric folding bicycle which can be used of propulsion.
- [17] R. S Jadoun & Sushil Kumar Choudhary May, 2020 Explore the acceleration and speed of electric powered bicycles.