International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2025: 7.089

Electric Vehicles Study and Analysis in Current Scenario

Mishti Abrol

Student at Ramaiah University of Applied Sciences, Bangalore, Karnataka, India
Email: *mishtiabrol100[at]gmail.com*

Abstract: ***Electric vehicles (EVs) were popular and are finding development with the history of automobile when researchers are finding alternate ways to fossil fuels. Experimentation started way back in 1830s. In US there were electric vehicles in 20th century. There is considerable price reduction, environmental protection, usage of plug-in hybrid vehicle and conventional hybrid vehicle. Current technologies result in the rise in pollutants like nitrogen oxide, Sulphur dioxide. EVs reduce emissions and are performing well in comparison to petrol/ diesel approaches. In this research work, the parameters are Kwh, weekdays, platform, days on which the vehicle has been used and achieved an output of 79.97% using support vector classifier. The black box approach adopted in the model uses machine learning. The model can be deployed for analyzing and studying various features required in the development of electric vehicles.***

Keywords: Electric vehicles, charging stations, pollutants, hybrid mode

1. Introduction

1880-1900 was a period for development of electric vehicles. Electric cars have not found a prosperous age before this. After hundred years same technology is formulating the basis of electric vehicles. [1] There is a similarity in plug in hybrid vehicle and conventional hybrid vehicle. In hybrid electric systems, petroleum fuels generate electricity whereas a hybrid vehicle uses battery packs. Battery packs cover short distances. Once battery depletes, there is a switch over to hybrid mode. Concept of regenerative braking and using internal combustion engine for maintaining constant speed. [2]. EVs find fewer number of components in the engine, which requires less maintenance. Cooling circuits are not required. Gear shifting, clutches reduce engine noise. Cost of electricity required is much lesser than fuel cost for combustion engine vehicles. The EVs are more comfortable and are subjected to lesser noise and vibrations. [3]

Weight of the vehicle is a crucial parameter deciding the performance and passenger safety in the vehicles. 1950-1970 vehicle weight was not a major criteria in the designs. In 1970-1980 steel was replaced by plastic materials and weight was reduced from 15% to 20%. Lower weight could not ensure passenger safety. Safety parameters added are airbags, automatic braking system. The safety equipments further add to weight. This all has relevance to fuel consumption and making a choice about the type of fuel being consumed. [4] Development with adoption of electricity in EVs, charging loads has adversely impacted power systems that cannot be ignored. High charging loads and employing fast charge stations results in increased peak load demand, voltage instability etc in distribution networks. [5] EVs provide low running cost, zero emission. Depending on fuel- based vehicles, the use of internal combustion engine has reduced. There is development of main stream transportation in almost all major countries. Efficiency of EVs is 77%. While that of ICE is 13%. Lesser adoption of EV is due to limited travel range, higher prices and lesser development of charging stations. [6]

Facilities like EV Electrical vehicles charging stations, efficiency and sustainability are kept in preview while deciding EV charging needs. In the work machine learning is applied. The factors considered are age, median income, education and car ownership. People with high income, higher age group 35-54 years and high education contribute to model performance. [7] Enhanced vehicle range impacts public charging infrastructure associated with anxiety and long recharge times. Obstacles decide the complexity and limitation in the adoption of EV Technology. Perspective in adoption of technology include technical infrastructure. [8] It is not clear to provide electricity for EV for low cost and lower values of CO_2 emission. Renewal sources provide electricity with low emission and with penetration rate not specified to meet the demand. Heat and power plants can provide efficiency but benefits of combining EVs and combined heat and power plants is missing. [9] Consumer behavior dictates adoption of hybrid or electric vehicles rather than conventional ones. Incentives might encourage the market of electric vehicles keeping in mind environmental friendly nature and working of electric vehicles. [10]

EVs are gaining momentum due to price reduction, environmental protection spread in various parts of the world and impact of conventional vehicle model on the climate. In the study, review of battery technologies like lead acid, lithium ion is discussed. Battery energy management and power control are reviewed. [11]

2. Methodology

A model has been developed using python in which an efficiency of 79.97% indicates the effectiveness of the approach. Kwh, weekdays, platform, days are the input parameters. The black box approach adopted in the model uses machine learning. Naive bayes classifier is the other approach used.

3. Future Scope

The various parameters in the electic vehicle design can be studied and their impact on each other and on the overall

performance of the EV can be studied and analyzed in future works.

References

[1] Høyer, K.G., 2008. The history of alternative fuels in transportation: The case of electric and hybrid cars. Utilities policy, 16(2), pp.63-71.
[2] Amjad, S., Neelakrishnan, S. and Rudramoorthy, R., 2010. Review of design considerations and technological challenges for successful development and deployment of plug-in hybrid electric vehicles. Renewable and Sustainable Energy Reviews, 14(3), pp.1104-1110.
[3] Sanguesa, J.A., Torres-Sanz, V., Garrido, P., Martinez, F.J. and Marquez-Barja, J.M., 2021. A review on electric vehicles: Technologies and challenges. smart cities, 4(1), pp.372-404.
[4] Berjoza, D. and Jurgena, I., 2017. Effects of change in the weight of electric vehicles on their performance characteristics. Agronomy Research, 15(S1), p.952.
[5] Deb, S., Tammi, K., Kalita, K. and Mahanta, P., 2018. Impact of electric vehicle charging station load on distribution network. Energies, 11(1), p.178.
[6] Hema, R. and Venkatarangan, M.J., 2022. Adoption of EV: Landscape of EV and opportunities for India. Measurement: sensors, 24, p.100596.
[7] Ruseruka, C., Mwakalonge, J., Comert, G., Siuhi, S., Indah, D., Kasomi, S. and Chengula, T.J., 2024. An Investigation of factors Influencing electric vehicles charging Needs: Machine learning approach. Transportation Research Interdisciplinary Perspectives, 27, p.101211.
[8] Kumar, S., Giri, J., Sharma, S.S., Gunaga, S.R., Sathish, T., Hasnain, S.M. and Zairov, R., 2024. Predictive analysis for removing obstacles in electric mobility: Revolution into EV adoption. Transportation Engineering, 18, p.100277.
[9] Brouwer, A.S., Kuramochi, T., van den Broek, M. and Faaij, A., 2013. Fulfilling the electricity demand of electric vehicles in the long term future: An evaluation of centralized and decentralized power supply systems. Applied energy, 107, pp.33-51. Cordera, R., dell'Olio, L., Ibeas, A. and Ortúzar, J.D.D., 2019.
[10] Demand for environmentally friendly vehicles: A review and new evidence. International Journal of Sustainable Transportation, 13(3), pp.210-223.
[11] Sanguesa, J.A., Torres-Sanz, V., Garrido, P., Martinez, F.J. and Marquez-Barja, J.M., 2021. A review on electric vehicles: Technologies and challenges. smart cities, 4(1), pp.372-404.