

# A Study of Electric Vehicle and Power Management Strategies

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## ABSTRACT

Electric vehicle as a possible way to control or reduce the greenhouse effect, it has been researched extensively with upgrades in the areas of power electrics, energy storage and holds up, the plug-in hybrid electric vehicle (PHEV) gives competitive driving range and fuel economy compared to internal combustion engine vehicles. The first electric vehicle can be traced back to a Scottish man named Robert Anderson as non-rechargeable batteries powered this vehicle that it failed. The first successful electric vehicle was known as 'Electro boat' and 'Ricker electric vehicle.' These vehicles were manufactured by the 'Electric vehicle company in the 1890s. In the 1990s, these vehicles started to receive great competition from the internal combustion engine, which consumes cheap gasoline, and for this, the gas tanks can be filled within the required tanks to charge a car battery (Ziyuan et al., 2016).

- *Prius is a hybrid vehicle that utilizes both the internal combustion engine and electric motor. As gas prices are increasing and rising environmental concerns, both manufacturers and customers are interested in buying in or investing in electric vehicles and hybrid cars. Many of the major companies have at least one model of a hybrid electric vehicle or electric vehicle.*
- *Pure Electric Vehicle: Pure electric vehicle, also known as an all-electric vehicle, operates solely on electricity. An on-board battery pack module stores the electricity which is used to start or run the vehicle.*
- *Plug in hybrid electric vehicle: On a technical scale, these plug-in hybrid electric vehicles are conceptually like an all-electric vehicle. Besides the engine, PHEV uses four motors; they are a combination of conventional fuels and electricity stored in the battery. As compared to all-electric vehicles, PHEV's battery capacity is lower. Therefore, it needs a short charging time (He et al., 2019).*
- *Charging stations in US: According to data which the US department of energy gave, there are 1182 electric charging stations across the nation, which gives a total of 29,901 charging outlets.*

**Keyword:** *Electric Vehicles, Efficiency, PHEV*

## BENEFITS OF ELECTRIC VEHICLE

Consumer's financial benefits: The federal and state government gives financial benefits to increase the purchasing of an electric vehicle, whose upfront cost might seem at first daunting. The California state offers \$2,500 rebates to electric vehicle buyers to increase market share and promote these electric vehicle technologies. There Will be less demand for oil when more customers invest in this technology, reducing the cost of importing foreign oil (Pilkington, Dyerson, 2006).

Moreover, many electric vehicle companies offer discounted electricity consumption rates during off-peak hours to encourage consumers to charge their vehicles at night rather than a day during peak hours.

- **Environmental Benefits:** Using electric vehicles benefits the environment in many ways. If there is more usage of electric vehicles, it reduces greenhouse gas emissions. Burning coal at electric power plants is not much better than burning oil, as the electricity generated for electric vehicles is from the energy sources which are better than the other, hydropower, solar power (Hannan 2018).

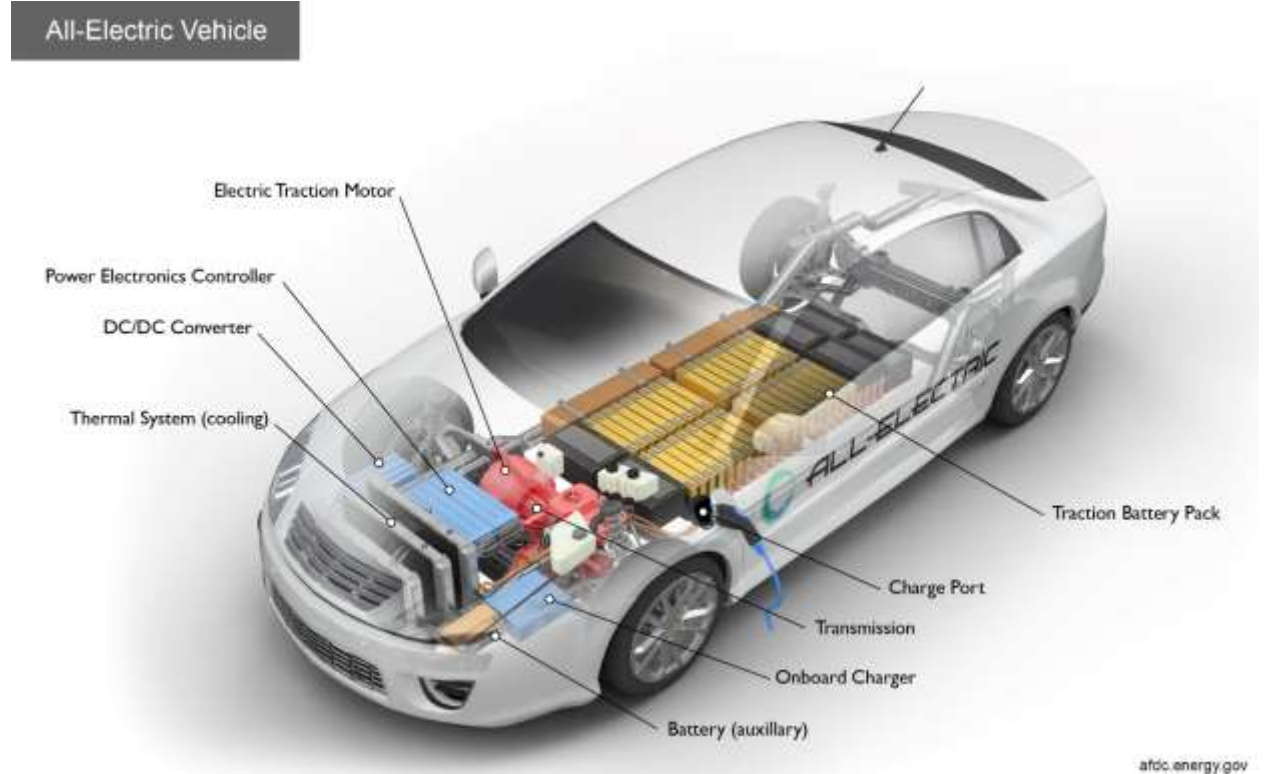
## Literature Review

In this paper, the study is being done to represent an overview of the recent developments of electric vehicles in the region. The author of this paper has conducted his study on the electric vehicle developments, and the

author has described the various developments and the comparison regarding the parts of the components of the electric vehicle. This research is being conducted by considering some of the electric vehicle's critical components, including the motor.

Some of these types are induction motor, DC motors, switched reluctance motor and so on, energy storages within the vehicle such as batteries, ultracapacitors, the charging systems used for the electric vehicle, the charging network, the breaking, and the steering. Also, the other components for the electric vehicles include the vehicles' security lightings, which play a significant role, especially during the night times and when there are changes in the environment, such as in cloudy situations.

By considering these new components for the electric vehicle, the paper has defined all the developments that are made recently for the effective use of electric vehicles. As this paper first involves describing the energy storages of the vehicle's general structure, it has continued to define the recent electric vehicle developments within the region.



### **Electric vehicles: A review of network modeling and future research needs**

As the significance of the electric vehicles is increasing nowadays to a greater extent to reduce the greenhouse gas emissions, despite of all these extensive attributes, and the characteristics of vehicles are still evolving. It provides the comprehensive evolution of electric vehicles, and it identifies the existence among research gaps, and theories, modelling approaches, solution algorithms, and some of the applications. I conclude that it has the great importance over all the electric vehicle characteristics. As well it predicts the routing behavior, and charges the infrastructure design networks (Kwon, 2020).

### **Overview of Electric vehicle concept and power management strategies**

This paper mainly discusses the effective implementation of the electric vehicle concept and the control algorithm of the robust power management, which may lead to obtaining the electric vehicle that can be affordable for all the users within the region as the electric vehicle can make the intelligent use of all the limited resources to a possible extent. To enhance this paper's study, the author has used many different approaches in which they have found that the control method is the effective method. Also, this paper has defined the structure of power management, which will help obtain the effective use of electric vehicles.

For developing the customized services which relate to the logistics and the fields, the data which is collected by the analysis can be used. Within the developing electronic device models, the data can be widely used. Additionally, to understand driver's analysis along with the needs, it would be better to use the data which is collected from the

driving habits of the customers. Based on the available data within the market, the products and services may create the driving habits of the system.

By the customer preference, range prediction, and electronic machine trims would be defined depending on the customer characteristics. One of the major questions which are concerned by most people is regarding the location of the charging station. Hence the company named Hyundai has been providing the Hi-charger application, which is useful for finding the location of the charging center. Along with the location of the charging center, it is also important to know about the remaining range of the battery. For that purpose, the trip computer located within the current EVs can be used.

Meanwhile, to predict the more accurate the range and the map far to go with the remaining battery, the company has been providing the service. It has Electric vehicle power consumption, ambient conditions, and energy consumption, and range estimation based on the big data. Within the winter and operating air conditioner within summer, the batteries are highly used for not only driving but also for that purpose.

Based on the data which is collected by big data, the energy consumption and range estimation would be performed. The possible range without charging can be displayed within the map by combining it with real-time traffic information. The data analysis results would be applied within the development of the products of the actual vehicles. For the usual model year change, the prestige is a little different within the characters. The trims have been developed by Kia motors, as most of the consumers prefer to have large batteries within the vehicle.

This paper aims to determine the significance of electric vehicles in this present global situation. For this purpose, the data regarding electric vehicles are being collected from various sources, which will help this study be useful. Electric vehicles that will run using electricity. Electricity is produced from water and sunlight. Electric vehicles are used to avoid pollution created by fuel vehicles. The use of electric vehicles started in the past two decades. Electric vehicles do not emit harmful gases. They are meant to reduce pollution. The use of electric vehicles is mostly done in four-wheelers (Popescu, Goss, Staton, Hawkins, Chong, Boglietti, 2018).

The vehicles that are run by using electricity are known as electric vehicles. Usage of electric vehicles is increasing in the 21st century. The electricity is produced by using water and sunlight. Program is written to run the car with automating mode. Using sunlight is safer than using water. Electric vehicles run without the help of a human. Some of the vehicles like Cwill run without the help of a man. The machine used to create Tesla is automatic. Electric vehicles should be the preferred option for users.

The gases emitted by the vehicles will cause damage to the ozone. The limited edition of electric vehicles is increasing. People are educated irrespective of their status. Everyone is familiar with the concept of electric vehicles.

The resources required for producing the electric vehicles are electricity, and motors. The technique required to implement is the charge given to the vehicles (Vasili, 2020).

Examples of electric vehicles are trains, cars, planes, etc. The need for electric vehicles is to have a smooth drive. Renewable sources like petrol and diesel are not up to the market. The resources that the users finish is known as non-renewable resources. Resources like air and sunlight are renewable because they will not end by usage. Coal and drinking water are also renewable. Electricity is produced using coal.

Water also helps in making electricity. The effective way to produce electricity is by using sunlight. Sunlight is known as solar energy. The energy emitted by the sun is renewable. There is no end to the strength and light from the sun. Using sunlight as a source of electricity is the best way to produce power. The need for water is more than sunlight. Drinking is necessary for all living organisms. Protecting and storing water for future generations is as important as living.

The train will run by using electricity. The electric wires are placed at the top of the train but not with a connection. The wires are put to the poles so that the train passes by, touching the wires. Electric vehicles will not use petrol or diesel. Oil is extracted from the ocean, which causes pollution in water bodies. Pollution in water will cause damage to the marine world. Renewable resources are the best sources to make electricity.

The harmful gases produced from vehicles will cause lung diseases to the living organisms. The act of securing the environment is the best way to show our gratitude.

The reason behind the creation of electric vehicles is to stop using non-renewable resources. Having electric vehicles will let people charge their vehicles. The electric vehicle runs to the maximum period depending on the charge given.

### **Impact of electric vehicle in the future**

An updated version of the energy policy simulator has been released by the energy innovation. Additionally, it has various things, such as policies that are based on emission, cost savings, and early death. As a result of implementing electric vehicles, there may be a higher impact on petroleum prices since they have the dependency on various factors such as the global market with oil along with the production levels within the foreign countries.

Through publishing the low and high oil prices scenarios, the energy information administration account has been impacted. For improving the efficiency of new gasoline powered LDV's selling, the fuel company standards may require the carmakers. The impact of the EVs would be reflected on the electricity system planners. There is a presence of the ever-greater role within the U.S transportation sector.

Hence there is a greater impact on the system. There may be a high level of a success story for clean energy due to the large built-out of the electric vehicle charge. The self-driving capability of the tesla company would have been pushed from 3 to \$53k within the various systems. For considering the various cases within the EV costs, the future of the electric vehicle cost may not be well-known.

Hence it is clear that the future of the electric vehicle is not just the wave of the future. Instead, it is a saving lives today. The combination of the gasoline or diesel engine through an electric motor can be defined within the plug-in hybrids. Electric vehicles can save the climate as there may be less pollution due to the oil emission is not present.

The lifetime of the people due to the change on the localized air pollution would be lasted and have changed the life of the people.

### Conclusion

Electric vehicles are machines used to perform specified actions. In the olden days, devices are constructed to run cars; Nowadays, vehicles have been built with electrical energy. Electric vehicles involve moving and non-moving vehicles. Electric vehicles have been made for the past two decades (Yi Guo, Jingwei Xiong, Shengyao Xu, Wencong Su. 2016). The world is moving towards industrialization and advanced methods. Everything is being electrified. Information technology is modifying daily. People are using advanced machines and techniques.

The work done by a person will take more time. Comparatively, the work done by the device will complete in less time. Electric machines are invented to run with electricity. The reason behind the electric name machines is electricity. The power consumed by vehicles is derived from electricity. Electric vehicles will involve cars, motorcycles, planes, trains, etc. Mainly trains run by using electricity. The electric wires are placed at the top of the train. The antenna of the train gets contacted with the cables and produces energy to run the train. The need for electric vehicles is to reduce the time. Reducing the time will allow people to perform more tasks.

Electric cars are examples of advanced technology and the global world. Machines are constructed using electricity as the working fuel. Humans build machines. The experience of the human is put into the implementation to make vehicles (Naseri, Farjah, Ghanbari, 2017). Two-wheelers are the best examples of electric vehicles. Vehicles work with the help of motors. Other than vehicles, machines like water motors are also electric machines. The high technology of the world made people use all the current devices (Frag, 2020). Electric vehicles are of different types. Trains are the best example of electric vehicles. Trains run by using electricity instead of human power. The power consumed by the trains is through electricity.

Electricity is extracted by using different ways. Hydropower will produce electricity by using water. Much water is used to produce electricity that is currently used in many countries. Solar energy is the other source to produce electricity (Yang, Zha, Wang, Liu, Xiang, 2020). The use of solar energy is less when compared to hydropower. Solar energy is obtained through sunlight. Solar plates are used to take power from the sun and convert it into electricity. The electricity obtained from solar energy is renewable (Liu, 2018). Electricity produced by using water is non-renewable. The use of solar energy is an efficient method.

Electric vehicles will stop creating pollution. The gases emitted from the vehicles will cause corrosion. Gases are emitted from the vehicles when fuel is burnt. Petrol and diesel vehicles produce smoke that causes pollution. The harmful chemicals emitted from the vehicles will damage the ozone layer. Electric vehicles will not pollute the environment (Shen, Zhong, Zhang, Zhang, 2021). They will not emit toxic gases like methane and carbons. Using electric vehicles is a secure way of having harmless transportation. However, electricity production also has its effects. The production of electricity from solar energy will not cause any harm to the environment. However, the production of electricity by using hydropower will cause damage to the ground due to non-renewable drinking water resources (Ziyuan Huang, Jiancheng Fang, Xiquan Liu, Bangcheng Han. 2016).

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