A REVIEW ON ELECTRIC VEHICLE

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Abstract: Plug-in hybrid electrics vehicles (PHEVs) have been extensively studied, and advancements in power electrics and energy storage have made them quite competitive with traditional internal combustion engine vehicles (ICEVs). By using optimized control strategies and energy management systems (EMS), PHEVs can become even more efficient. In my own words, PHEVs are vehicles that combine the benefits of electric and gasoline power to provide a good driving range and fuel economy. Battery and super capacitor technologies are also being explored to increase the energy capacity of PHEVs.
It's exciting to see how these advancements are shaping thefuture of transportation

INTRODUCTION: An electric vehicle (EV) is a vehicle that runs on electricity instead of gasoline or diesel. It has electric motors that power the vehicle. The electricity can come from different sources, like a battery that can be charged with solar panels or from an external power source. EVs can be cars, trains, boats, planes, and even submarines! They're a more sustainable and environmentally friendly option compared to traditional vehicles.Electric road vehicles include electric cars, electric buses, electric trucks, and personal transporters like electric bikes, scooters, and motorcycles. These vehicles are part of a future vision of transportation called Connected, Autonomous, Shared, and Electric (CASE) mobility. It's all about using advanced technology to make transportation more efficient, convenient, and environmentally friendly.In the late 1800s, electric vehicles started appearing thanks to advancements in electricity during the Second Industrial Revolution. People liked electric cars because they were quiet, comfortable, and easy to drive compared to the gasoline cars of that time. However, the batteries at the time couldn't store much energy, so people were worried about running out of power while driving. As a result, gasoline and diesel engines became the main way to power cars and trucks for about a century. But electric power remained popular for other types of vehicles like trains, trams, and buses. It wasn't until the late 1990s that hybrid electric vehicles, which combine electric motors with internal combustion engines, became more common. Plug-in hybrid electric vehicles, where the electric motor is the main source of power, didn't become widely available until the late 2000s. And it wasn't until the 2010s that battery electric cars became practical options for regular consumers.

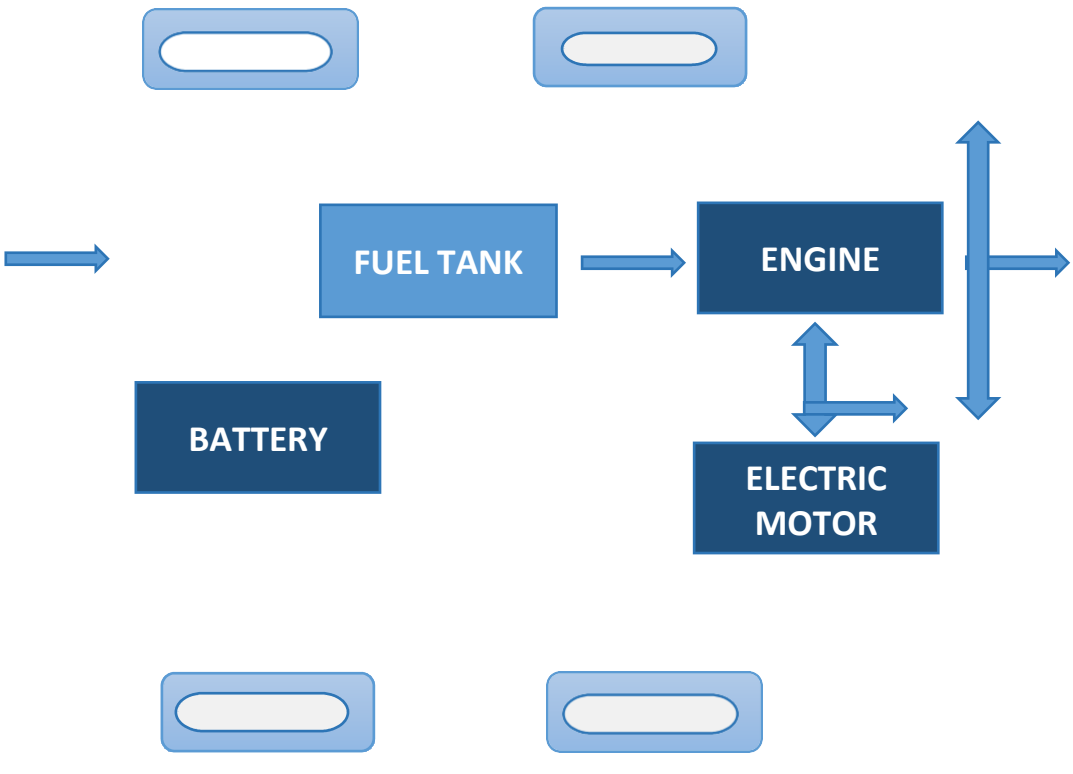
CLASSIFICATION OF ELECTRIC VEHICLE:

Electric vehicles (EVs) can be classified into different categories based on their power sources and designs. Here are some common classifications:

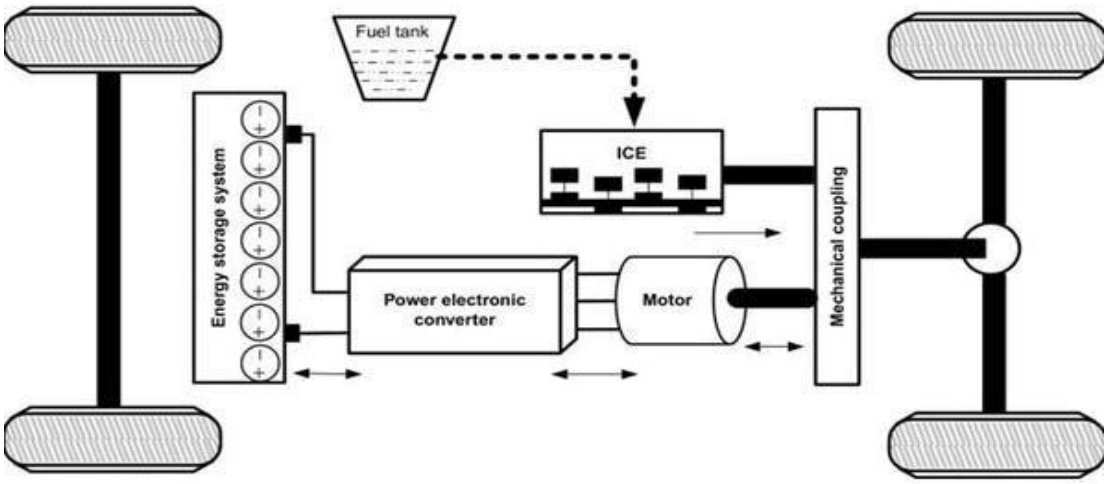
1. Battery Electric Vehicles (BEVs): In this type the vehicles are solely powered by rechargeable batteries ,it provide electricity to electric motor which drives the wheels.It doesn't use internal combustion engine (ICE).It is capable to produce zero tail pipe emission.Example Tesla Model S.

2. Hybrid Electric Vehicles (HEVs) It consist of internal combustion engine with an electric motor and small pack of battery .These are designed to be more fuel-efficient and environmentally friendly compared to traditional gasoline or diesel-powered vehicles. The electric motor in HEVs helps the internal combustion engine (ICE) during acceleration, which reduces fuel consumption and emissions. And during deceleration, the electric motor acts as a generator, converting kinetic energy into electrical energy to recharge the battery.

Plus, HEVs have smaller battery packs that can't be charged externally but are recharged through regenerative braking and excess power from the engine. It's amazing how these technologies work together to make driving more eco-friendly.

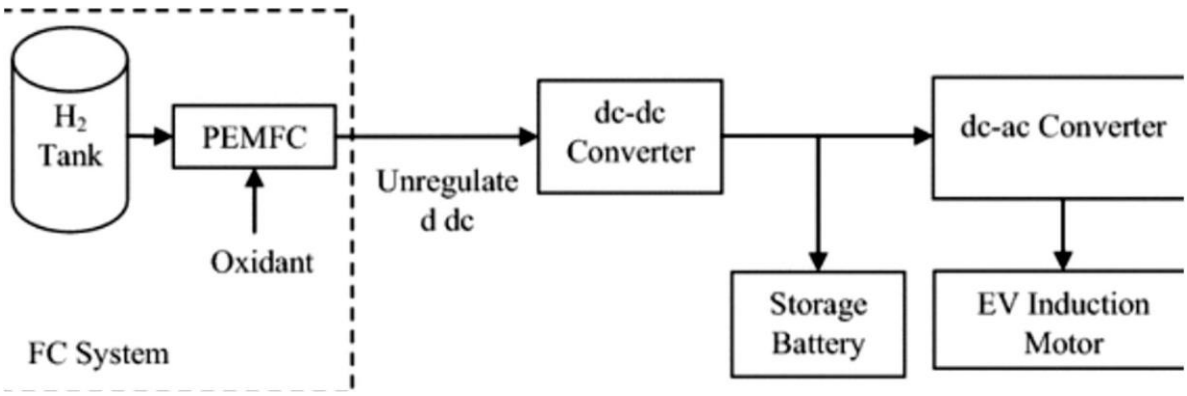


3. Plug in -Hybrid Electric Vehicles (PHEVs):IT is a combination of a traditional internal combustion engine with an electric motor,rechargeable battery.it can alone run on electricity it cover a limited range and switch to internal combustion enginewhen battery starts depletes.



4. Fuel cell Electric Vehicles (FCEVs): it use hydrogen fuel cell to generate electricity which help to power the electric

motor .these type of vehicles emits only water vapour they have long range as compared to battery powered.tail pipe emission.Example Tesla Model S.



MOTORS USED IN ELECTRIC VEHICLE

DC SERIESS MOTOR:

The DC Series motor is actually a great choice for traction applications because it has a high starting torque capability. Back in the early 1900s, it was widely used for traction. One of its advantages is that it's easy to control the speed, and it can handle sudden increases in load. That's why it's considered an ideal traction motor. However, one drawback is that it requires regular maintenance because of the brushes and commutators.In India, these motors are commonly used in the Indian railways**.**

BRUSHLESS DC MOTOR:

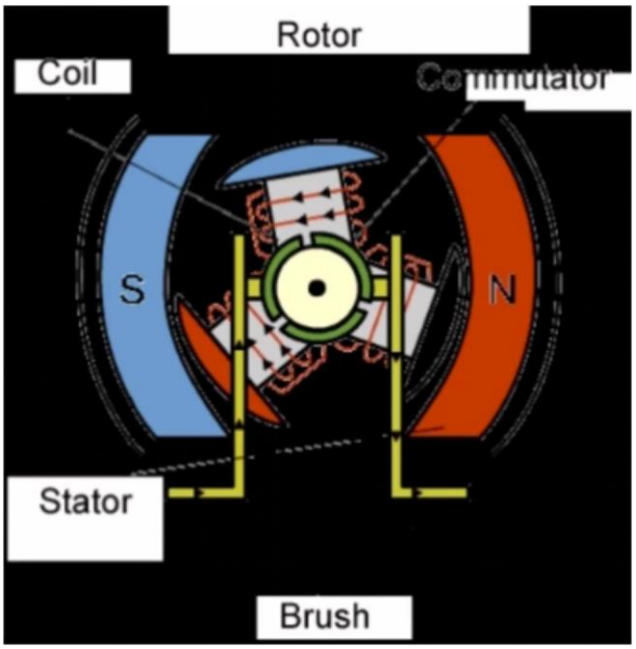
It's similar to regular DC motors but doesn't have the commutator and brush arrangement. Instead, the commutation is done electronically, which makes BLDC motors maintenance-free. These motors have some great traction characteristics like high starting torque and high efficiency (around 95-98%). They're also suitable for high power density designs.

Now, BLDC motors have different types, and one of them is the out-runner type. In this type, the rotor is on the outside, and the stater is on the inside. It's sometimes called a hub motor because the wheel is directly connected to the outer rotor. This type of motor doesn't need an external gear system and can even have built-in planetary gears in some cases. It's a popular choice for electric cycle manufacturers like Hullikal, Tronx, Spero, and light speed bicycles. It's also used by two-wheeler manufacturers like 22 Motors and NDS Eco Motors.

The in-runner type BLDC motor in simpler terms for you. In this type, the rotor of the motor is on the inside, and the stator is on the outside, just like conventional motors. However, the difference is that this type of motor requires an external transmission system to transfer the power to the wheels.

Because of this, the out-runner configuration, where the rotor is on the outside, is a little bulkier compared to the in-runner configuration.

Many three-wheeler manufacturers like Goenka Electric Motors, Speego Vehicles, Kinetic Green, and Volta Automotive use BLDC motors. Additionally, low and medium-performance scooter manufacturers also use BLDC motors for propulsion.



TECHNOLOGY OF BATTERY ELECTRIC VEHICLE

Battery Electric Vehicles (BEVs) use a different technology compared to Hybrid Electric Vehicles (HEVs). In BEVs, the vehicle is powered entirely by rechargeable batteries. These batteries store electrical energy that is used to run an electricmotor, which propels the vehicle forward.

When you charge a BEV, you're essentially filling up its "fuel tank" with electricity instead of gasoline or diesel. The vehicle can be charged by plugging it into a power source, such as a charging station or a regular electrical outlet at home. The electricity is then stored in the vehicle's battery pack.

The battery pack in a BEV is made up of multiple individual battery cells, similar to the batteries you might use in everyday devices like smartphones. These cells work together to provide the necessary power to drive the vehicle.

FUTURE SCOPE

There are different future scopes of electric vehicles **Advancement in batteries** the continues search and development in battery technology try to making the electric vehicles efficient and more practical regularly improvement in the energy density,charging speed also enhancement in range and performance of electric vehicles.

Reduce emission The improvement in electric vehicles help to reduce the green house emission it also improve the air quality and public health.Because of zero production of tailpipe emission .they contribute more sustainable transportation.

Cost Reduction the scale of economy increased through increase in production .The cost of manufacturing is expected to decrease.the cost of batteries is reduce due to the advancement in battery technology.they are becoming affordable.

Charging Infrastructure The development in infrastructure of extensive charging support the widespread adoption of electric vehicle.various fields like government ,utility companies and private investor are investing in public charging station and fastcharging technologies.

Diversification of vehicle Types The future of electric vehicles is extended beyond passenger cars.electric trucks ,buses,vans and also two wheeler are gaining momentum,offers potential to reduce emission in various transportation sectors.

On the behave of these factors the future of electric vehicle appears promising ,increase in market acceptance, advancement in technology.

CHALLENGES IN ELECTRIC VEHICLES

1. Battery Range and Long Charging Time: regular improvement in battery technology,the range of electric vehicles still falls short as compared to conventional vehicles.Electric vehicles required longer charging time for long -distance travel.Enhancement in battery energy density and charging speed are crucial to overcome those limitation.
2. Lack of Awareness and Education in Consumer: A large amount of consumers are still unfamiliar to these benefits andtechnology of electric vehicle. Educating them about the advantages of EVs.
3. Lack of Standardization:Standardization of charging infrastructure protocols,connectors is vital to ensure compatibility among different EV models and charging stations.
4. Transition in Energy Grid: Widespread adoption of electric vehicle raised additional demand in electricity grid.Ensure thecapacity and stability of grid's to handle the increased load ,infrastructure with renewable energy resources.

CONCLUSION

Electric vehicles are indeed a significant advancement in transportation technology. They offer a cleaner and more sustainable alternative to traditional internal combustion engine vehicles. By using electric motors powered by rechargeable batteries, EVs eliminate the need for fossil fuels and help reduce greenhouse gas emissions. Here are some keypoints about electric vehicles:

EVs contribute to reducing air pollution and carbon emissions since they produce zero tailpipe emissions. This helps in mitigating the negative environmental impacts caused by transportation.

Electric motors are generally more efficient than internal combustion engines. They convert a higher percentage of energy from the battery to motion, resulting in less energy wastage and better overall efficiency.

Electric vehicles have reduced operating costs compared to traditional vehicles. This is mainly because electricity is generally cheaper than gasoline or diesel. Additionally, EVs often require less maintenance since they have fewer movingparts, which can lead to long-term cost savings.

The driving range of electric vehicles has been improving as battery technology advances. However, it's still important to consider driving range, especially for long journeys. It's worth noting that the range of EVs can vary depending on factors likebattery capacity, driving conditions, and weather.

Overall, electric vehicles are a promising solution for a cleaner and more sustainable future of transportation.

REFRENCES

Calise, F.; Cappiello, F.L.; Cartenì, A.; d'Accadia, M.D.; Vicidomini, M. Case studies for Naples and Salerno (Italy).Renew. Sustain. Energy Rev. 2019, 111, 97–114. [Google Scholar] [CrossRef]

Jungst, R.G. Recycling of electric vehicle batteries. National Statistical Institute of Norway. Public Transport Statistics.2019.Availableonline:https://www.ssb.no/en/transpo rt-og-reiseliv/statistikker/kolltrans (accessed on 12 February 2021

International Energy Agency. Technical Guidelines on Charging Facilities for Electric Vehicles; Technical Report; Goverment of Hong Kong: Hong Kong, China, 2015. Available online: https://www.emsd.gov.hk/filemanager/en/content444/Chargin gFacilitiesElectricVehicles.pdf (accessed on 2 February 2021).

Zhao, O. C. Doering, and W. E. Tyner, "The economic competitiveness and emissions of battery electric vehicles inChina," Applied Energy, vol. 156, pp. 666–675, 2015.

M. H. Amini, M. P. Moghaddam, and O. Karabasoglu, “Simultaneous allocation of electric vehicles’ parking lots and distributed renewable resources in smart power distribution networks,” Sustainable Cities and Society, vol. 28, pp. 332–342,2017

Hong, Y. Huang, H. He, L. Chen, L. Wei, and A. Khajepour, “Chapter 5–Energy management of hybrid electric vehicles,” Modeling, Dynamics and Control of Electrified Vehicles, Woodhead Publishing, pp. 159–206, 2018.

Correa, P. Muñoz, T. Falaguerra, and C. R.Energy, vol. 141, pp.537–549, 2017.

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