International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 8 Aug. 2022, pp: 629-631 www.ijaem.net ISSN: 2395-5252

Current Progress Inelectric Vehicles

Chinmay Kaushik, Dr.JPKesari
Delh iTechnological University

Submitted: 05-08-2022 Revised: 11-08-2022 Accepted: 15-08-2022

ABSTRACT
Thispaperprovidesanoverviewofthecurrentworkofelectricvehiclesintheworld.Thepaperoutlinesthe development, evolution, and the comparison of various different part of components involved inthe design and manufacturing of EVs. The major components involved include battery technology,chargerdesign,motor,steering,etc. Thepaperatlengthhighlightssomeelectricvehicleprototypeasaconclusiontothepaper.

Keywords – Electric vehicle, AF, steering system, braking system, ABS, battery management systems,BMS,Inverter

I. INTRODUCTION

Electrical vehicles (EVs) are based on electric propulsion systems, no internal combustion (IC) engineis used. All the power is rooted on electric power as the primary energy source. The main advantageis the high efficiency of power conversion through its proposition system of the electric motor.Recently there has been great research and developmental work reported in both academia andindustry. Commercial vehicles are also available, and many countries have already provided variousmotive to users and manufacturers by lowering lower tax or providing tax exemption, free parking,and subsidized charging facilities. On the other hand, the hybrid electric vehicle (HEV) is anotherpossible alternative. It has been used widely in the past few years. Nowadays, almost all the carmanufacturers have at least one model in hybrid electric vehicle. The questions that arise here is:Whichvehiclewilldominatethemarket,andissuitableforfuture?Thispaperistoexaminetherecentdevelopmentofelectricvehicleandsuggestthefuturedevelopmentinthisregard.

II. EVANDHEV

HEV has been fostered extensively in the last decennary. It is meant to rescue the battery energystorageproblemsatthattime.Usinghybridvehiclesallowselectricpowertobeacquiredfromengine.HEVs are classified into two categories: series hybrid and parallel hybrid. The engine power of theseries hybrid completely depends on the battery as, all the motor power is derived from the battery.Asfortheparallelhybrid,boththeengineandmotorcontributetothetotalpropulsionpoweroutput.The torque derived is the net sum of both the motor and engine. Also note that, motor can also usedas a generator to absorb the power from engine through the battery transmission. Both series andparallel hybridscanabsorbpowerthroughregenerationduringbrakingordeceleration.

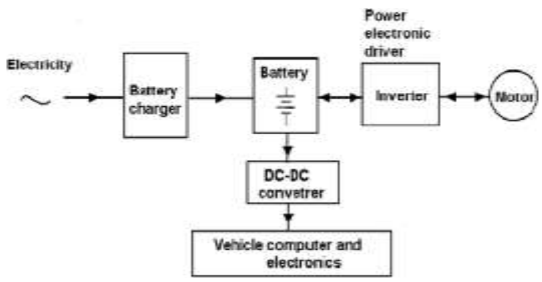

Figure1SeriesorParallelpathofanEV

Nevertheless, HEV still has emission issues which needs to be taken care of. The latest developmentsin the field of plug-in HEV attempts to solve some of these problems. It accepts electric power tobattery via plug in from the mains. Therefore, when convenient, users may charge the battery usingACfromthemains.

III. KEY COMPONENTS IN EV

The electric vehicle has a rather straightforward structure. The key components are the propulsionparts shown in detail in Fig 2, the battery is the main energy storage, battery chargers are used toconvert the electricity directly from mains to charge the battery. The battery voltage is DC, and I isreversed into switched-mode signal through power electronic inverter to drive the motor. The otherelectronic components in a vehicle can be supplied to the battery through AC-DC converter that stepdownsthevoltagefromthebatterypacktovoltagesaslowas20-50V.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 8 Aug. 2022, pp: 629-631 www.ijaem.net ISSN: 2395-5252

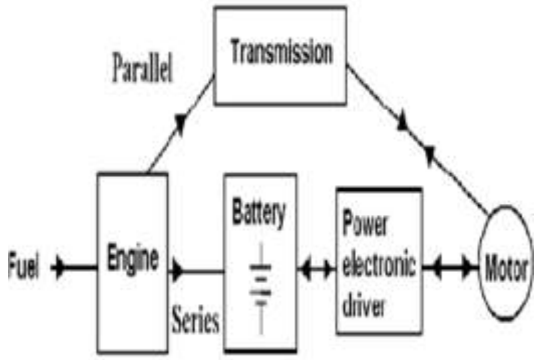

Figure2KeycomponentsinEV

IV. MOTORS

There are various types of motors available for electric vehicles: DC motors, Induction motor, DCbrushlessmotor,Permanentmagneticsynchronous motor,andSwitchedreluctancemotor.

1. DCmotors:Itisaclassicalandmostusedmotorand hasbeenusedinmotorcontrolforalongtimeand continues to be relevant. All the power involved in the electromechanical conversions is movedtotherotorthroughnondynamicbrusheswhichareinfrictionalcontactwiththecoppersegmentsofthe commutator. However, it requires regular maintenance and has a shorter lifetime. Generally, it ismostsuitableforlowpowerapplications.Ithasfoundapplicationsinelectricwheelchairs,transporter,andmicro-car.Today,almostallgolf-cartsareusingDCmotorswherepowerlevelsareaslowas4KW.
2. Induction motor: It is one of the most popular AC motors. Moreover, it has a large market share influctuating speed drive application such as air-conditioning, elevator, and escalator. Many of thehigherpowerelectricvehicles,withpowerlevelrequirementsofmorethan5kWuseinductionmotor.Usually,avectordriveisusedtoprovidetorqueandmonitorsthespeed.

V. DIRECT DRIVE AND IN WHEEL MOTOR

OneofthemajoradvantagesoftheDirectdrive isthatitreducesthelossesincurredinthemechanicalunits to the drive train. The motor is directly connected to the shaft in a straight line to decreaserequirements of transmission, clutch, and gear box. The in-wheel motor is there to turn the rotorinside out and is connected to the wheel's rim and the tire, however, there is no gear box and driveshaft.Fig3showsthein-wheelmotoralsocalledthewheel-hubmotor.Itsmainadvantageoverothersis that is independent of the control of each wheel. Fig 4 shows the 4-wheele drive vehicle. Each ofthe wheels can work at any speed and direction which not only aids in parallel parking but also theAnti-lock braking system (ABS) can be implemented effortlessly by this technology. Moreover, it hasshown that it can successfully prevent spinouts. Many different types of motor can be utilized for in-wheel motor. The prominent one being switched-reluctance types. Its phase-winding is independentand therefore the fault clemency is much more advanced than any other. There is no permanentmagnet in the motor, which reduces any interference by permanent field and the fluctuation of thepermanentmagneticmaterials.

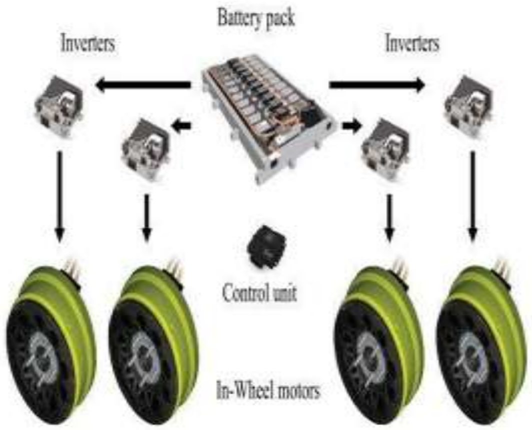

Figure3Thein-wheelmotor

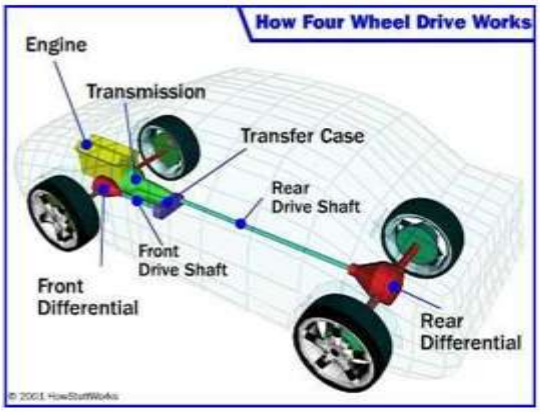

Figure4Fourwheeldrive

VI. CHARGINGSYSTEMS

1. General charger:

The charger required for the battery system for slow charging or fast charging are both required tohandle high power levels. The most used converter is the H-Bridge convertor shown in Fig

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 8 Aug. 2022, pp: 629-631 www.ijaem.net ISSN: 2395-5252

5.Theconverterisdesirableforitsefficiencyandhasfoundapplicationinchargerand DC-DC converters.

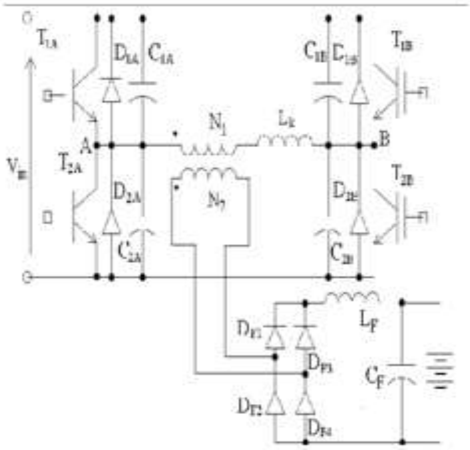

Figure5 H bridge convertor for charger

2. Ultra-capacitorcharger:

The voltage on the ultra-capacitor charger various from the full voltage to zero nits' and the energystorage varies from full to zero. It is important to note that, this is different from the battery as itsvoltage varies only within 25% limit. The capacitor voltage is internal point and is not in contact withthe users. A tapped converter must be used as it will exhibit higher efficiency for power conversion.Theefficiencyofthepowerconverterishigherthanthetransformer-isolatedversionandthestructureisstraightforward.

3. Batterymanagementsystems:

ItisalsoreferredtoasBMS.Thebatterysystem isformedbyseveralbatterycells.Theyareconnectedin parallel or series according to the design. Each cell should bemonitored and regulated. Theconditionedobservationsincludethevoltage,currentandtemperaturechecks.Themeasuredparameters are used to provide the decision framework for the system control and protection. Twolimits are provided- the state of charge (SoC) and the State of Health (SoH). SoC is like the oil tankmeter that provides the battery a charging condition and is measured by the information of voltageand current. The SoH is to account for the health or aging condition. There are a few definitions buttheprominentoneis:

SoH=(NominalCapacity-LossofCapacity)/(NominalCapacity)

Cellbalancingistoensurethateachcellisoperatingunderthesamecondition,oraregulationisusedto charge or discharge each cell by the balancing control. This avoids the overloading of a particularcell. Energy management systems for ultra-capacitor systems, is made by a few capacitors in acombination with other energy storage devices such as battery. The same conditioning monitoringandmanagementsystemwill beused.

VII. CONCLUSION

This paper discusses the latest developments in electric vehicles. The paper first describes generalstructure and discusses the energy storage. It then extends to the future vehicle components. Thepaperprovidesanoverviewoftherecent EVwork.

REFERENCES

[1] Jones,W.D.,"Hybridsto therescue[hybridelectricvehicles]",IEEESpectrum,Vol.40(1),

[2] Jones, W.D., "Take this car and plug it [plug-in hybrid vehicles]", Spectrum, IEEE, Vol. 42, Issue 7,July2005,

[3] Hyunjae Yoo; Seung-Ki Sul; Yongh Park; Jongcan Jeong, "System Integration and Power-FlowManagement for a Series Hybrid Electric Vehicle Using Supercapacitors and Batteries", IEEE Trans. onIndustryApplications,Vol.44,Issue1,Jan.-Feb.2008, pp.108–114.

[4] Haddoun,A.; Benbouzid,M.E.H.; Diallo, D.;Abdessmed, R.; Ghouili, J.; Srairi, K., "ALoss-MinimizationDTSchemeforEVInductionMotors",IEEETransonVehicularTechnology,Vol.56(1),

[5] Jinyun Gan; Chau, K.T.; Chan, C.C.; Jiang, J.Z., "A new surface-inset, permanent-magnet, brushlessDC motor drive for electric vehicles", IEEE Transactions on Magnetics, Vol. 36, Issue 5, Part 2, Sept2000,pp.3810–3818.

[6] Chau, K.T.; Chan, C.C.; Chunhua Liu, "Overview of Permanent-Magnet Brushless Drives for ElectricandHybridElectricVehicles",IEEETrans.onIndustrialElectronics,Vol.55,Issue6,June2008,pp.2246–2257.

[7] Rahman, K.M.; Fahimi, B.; Suresh, G.; Rajarathnam, A.V.; Ehsani, M., "Advantages of switchedreluctancemotorapplicationstoEVandHEV:designandcontrolissues",IEEETransactionsonIndustryApplications,Vol.36,Issue1, Jan.-Feb.2000,pp.111–121.