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Design of Electrical Vehicles

Dnyaneshwar S Waghmode[1], Kamina S Chavan[2], Putaleebai S Banasode[3], Shravana K Gangade[4], Dipali L Badgire[5], Archana S Dudhalkar[6]

[2 3 4 5 6]*Students, Dept of Electrical Engineering, SSWCOE Maharashtra, India*
[1]*Assistant Professor, Dept. of Electrical Engineering, SSWCOE, Maharashtra, India*

Abstract - *In present scenario, air pollution has become a serious concern for the India. According to recent global report many cities in the India are most polluted cities. Major sector contributing to the air pollution are industrial sector and transport sector. Among this 51% of air pollution is caused by the industrial sector and 27% by electric the transport sector. Air pollution contributes to the premature deaths of 2 million Indians every year. In order to minimize the air pollution, vehicle (EV) can act as blessing in lowering the GHG (Green House Gases) emission. Electric as decreasing the pollution level and reduction in oil bills etc. Although there is considerable amount of threats in establishing the electric vehicles types of motor used for electric vehicles, batteries, and Architecture of Electrical vehicle in India*

Key Words: **Electrical vehicle, Motors, Battery**

1.INTRODUCTION

A vehicle which uses one or more electric motor for propulsion and powered by electricity source like battery, solar panels, fuel cells etc. EV includes transport vehicles like passenger cars, buses, heavy duty vehicle, locomotives, E- bikes, E- scooters, air and sea transport can also be an example of EV.

In the Globe, today market Electric Vehicles (EV) are one of the trending research technologies, Likely tesla is the leading manufacturer of electric automobiles. Tesla has sold 250000 S model cars, globally since 2013 [1]

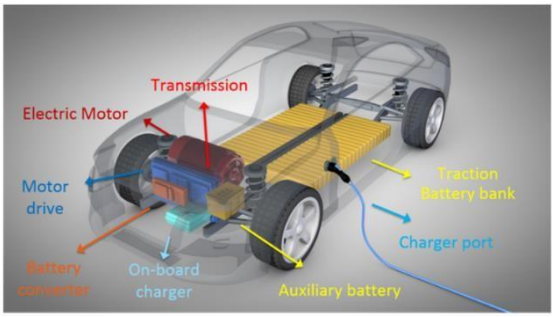

Fig 1: Internal View Of Electric Car

. The UK is the world leader in electric vehicles with 21200 followed by France with 20400, Indian EV market, given the urgently needed requirement for pollution control. Awareness of EV's costs advantages is one of the key contributors to this impact.

It is a symbol of all electric automobiles since the emergence of tesla motors. As tesla automobiles such as model S and model X employ state of the art technology has been designed primarily western market application, The public in India misconceives the value and the range of automobiles. The comparative study over Audi e-torn and tesla model S According to studies, the tesla motor may possess better efficiency with in smaller volume than the Audi. In a detail study on Nissan leaf EV has been to be carried out depending on generated electricity.it can reduce CO2 emissions by 70 % for a particular motorcycle

1.1 Architecture

The Electric vehicle architecture consists of 5 important components and through this component, the powertrain is completed in EV, such as the Electric motor, Battery pack, and Inverter, Charger, DC-DC converter, etc.

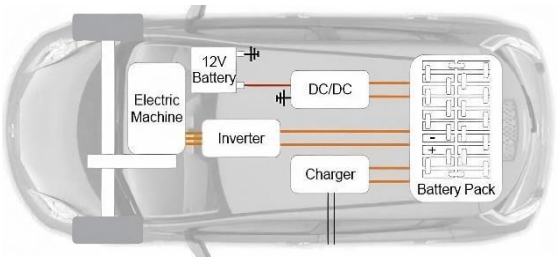

Fig 2:Architecture Of Electric Vehicle

Electric motors provide torque to the vehicle by utilizing electromagnetic fields, energy supplied by the battery, and the torque is controlled by varying the current flow. The electric motor gives more than 90% efficiency as compared to ICE. it provides torque with zero speed so it allows the vehicle with a single gear ratio between motor tire rather than multiple speed transmission.

Components of EV

- ❖ Electrical Propulsion System

1. Electric motor (EM)

2. Inverter
3. Power converter (DC-DC & DC -AC converter)

❖ Energy Source

1. Energy Source (battery, US etc)
2. Energy Management System
3. Charging unit

❖ Auxiliary System

1. Thermal Management system
2. Power steering, Headlamps, Wipers, etc.

1.2 Motor

There are a number of motors available for electric vehicles: DC motors, Induction motors, DC brushless motors, Permanent magnetic synchronous motors and Switched reluctance motors. [2]

Fig 3: Motor.

There are a number of motors available for electric vehicles: DC motors, Induction motors, DC brushless motors, Permanent magnetic synchronous motors and Switched reluctance motors. [3]

1. DC motors: DC motor work on the DC supply and Fleming's left-hand rule is applicable for the rotation of that. It has been used in motor control for a long time. In this electromechanical conversion is transferred to the rotor through stationary brushes [However, it is suitable for electrical vehicle low power applications. It has found that applications in electric wheel-chair, transporter and micro-car, and bru. Today, various places and machines are using DC motors. The power level is less than 5kW. In the electric busses, we can use this motor and it gives good efficiency. Torque development in DC motor can be shown in the below equation.

2. Induction motor: It's a very popular Alternate Current motor.

   It also has a large market share in controlled speed drive applications such as AC, elevator, or escalator.

There are various higher power electric vehicles, for more than 10kW.

3. Switched reluctance motor: This motor specification is also good for the use of electric and hybrid vehicles. It has variable reluctance that why this machine

4 DC brushless motor: The conventional Direct Current motor is poor in construction because of the low power winding of the field, is stationary while the main highpower copper winding rotates. The Direct Current brushless motor is "turned inside out. The high-power copper winding is put on the stationary side of the motor and the field excitation is on the rotor using a permanent magnet rotor [12]. The motor has a longer lifetime than the DC motor but is a few times more expensive. This specification is suitable for electric vehicle applications

5. Permanent magnetic synchronous motor: In this type of motor stator is similar to that of an induction type motor. The rotor is mounted with permanent electromagnets. It is similar to an induction type motor but the air-gap filed is produced by a permanent electromagnet which is placed in it. This motor is also suitable for electric and hybrid vehicles.

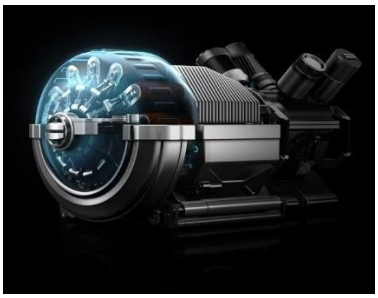

Fig 4:Motor

2.Battery

The battery in-fact governs the success of the electric vehicle Recently there are massive works being reported in battery development. The battery such as Li-ion is now being used by new generation of electric vehicle

Types of electric car batteries

There are four main kinds of batteries used in electric cars: lithium-ion, nickel-metal hydride, lead-acid, and ultracapacitors

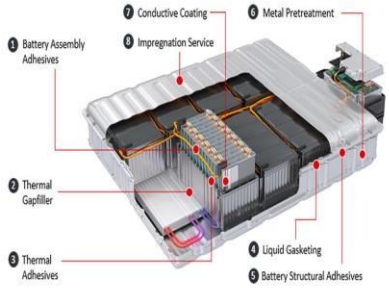

Fig 5. Internal Structure of Battery

1.Lithium-ion batteries [4]

The most common type of battery used in electric Car is the lithium -ion battery. may sound familiar as these batteries are also used in most portable electronics, including cell phones and computers. Lithium-ion batteries have a high power-to-weight ratio, high energy efficiency and good high-temperature performance. In practice, this means weight, which is vital for electric cars. Less weight means the car can travel further on a single charge. Lithium-ion batteries also have a low "self-discharge" rate, which means that they are better than other batteries at maintaining the ability to hold a full charge over time. Additionally, most lithium-ion battery parts are recyclable making these batteries a good choice for the environmentally conscious. This battery is used in both AEVs and PHEVs, though the exact chemistry of these batteries varies from those found in consumer electronics

2.Lead-acid batteries

Lead-acid batteries are only currently being used in electric vehicles to supplement other battery loads. These batteries are high-powered, inexpensive, safe, and reliable, but their short calendar life and poor cold temperature performance make them difficult to use in electric vehicles. There are high-power lead-acid batteries in development, but the batteries now are only used in commercial vehicles as secondary storage.

3. CONCLUSIONS

Research shown that electric cars are better for the environment. They emit fewer greenhouse gases and air pollutants than petrol or diesel cars. And this takes into account their production and electricity generation to keep them running.

The major benefit of electric cars is the contribution that they can make towards

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BIOGRAPHIES

Dnyaneshwar S. Waghmode.
Professor, Dept. of Electrical Engineering, SSWCOE, Solapur, Maharashtra, India.
dswaghmode@sswcoe.edu.in

Kamina S. Chavan.
Pursuing the Bachelor degree in Electrical Engineering from SSWCOE, Solapur, Maharashtra, India.
kaminachavan963@gmail.com

Putaleebai S Bansode .
Pursuing the Bachelor Degree in Electrical Engineering from SSWCOE, Solapur, Maharashtra, India.
pinky37bansode@gmail.com

Shravana K. Gangade.
Pursuing the Bachelor Degree in Electrical Engineering from SSWCOE, Solapur, Maharashtra, India.
shravanagangade09@gmail.com

Dipali L. Badgire.
Pursuing the Bachelor Degree in Electrical Engineering from SSWCOE, Solapur, Maharashtra, India.
dipaliba8866@gmail.com

Archana S Dudhalkar .
Pursuing the Bachelor degree in Electrical Engineering from SSWCOE, Solapur, Maharashtra, India.
archanadudhalkar5@gmail.com