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Implementation Of Electric Vehicles And Its Recent Development

[1]N.Raveena Sowmya, [2]M. Madhuri, [3]A.Sravani, [4]B. Leelambika
[1,2]Assistant Professor, Srinivasa Ramanujan Institute of Technology, Ananthapuramu, AP, India
[3,4]M.Tech Students from KoneruLakshmaiah Education Foundation, Vaddeswaram, Guntur, AP, India
raveenaravs7@gmail.com, madhuri.modupalli93@gmail.com, sravaniambalam@gmail.com, leelambika.boya@gmail.com

Abstract

This paper gives a detailed overview ofcurrent electric vehicle design and necessary improvements. The significant elements in an electric vehicle are designing an efficient charger, smooth functionality of motor, smart steering and energy-efficient system. In this work, advanced controlling models have exploited to develop an electric vehicle model. The simulation results outperform the current technology, and electric vehicle model is very efficient compared to existing models. The ANFIS controller and ABC model can improve the state of control and state of condition of an electric vehicle. The power consumption is improved by 40whr per kg; this is a good improvement.

Keywords —*Automatic electric vehicles, ANFIS controller, Power, Charging*

I. INTRODUCTION

Electrical vehicle (EV) is an advanced electrical framework, which can simplify the current technology framework. The motor is a key factor in EV design; the interior, the advanced motor is utilized to design an electric vehicle [1]. Under the dual pressure energy enhancement conditions, all countries are usually developing the electric car technology [2]. In India and china, national governments are encouraging this electric vehicle technology. Some electrical technologies based hybrid approaches encouraging electric vehicle efficiency more [3]. Nowadays, hybrid electric vehicles are the alternate technology compared to present vehicles. These are dominating the financial markets and very suitable for environmental conditions. In this investigation, recent developments of electric vehicles are designed and verified on an available simulator.

1. Hybrid Electric Vehicles.

Hybrid electric vehicles are prominently utilized from past decades; around 1.2 billion manufactures are designing them. It has an implemented battery storage and power engine based hybrid technology. The HEV is categorized into two phases one is series hybrid, and the second one is shunt hybrid. The power engine depends on battery connected to the circuit and many motors involved in HEV depends on torque summarized by motors. The regeneration mechanism can easily save power by using figure 1. The plex in HEV solves many critical problems and accepts the electrical risk, to minimize this risk, the convenient controllers are used thathave balanced the inverting technique from the battery to circuits.

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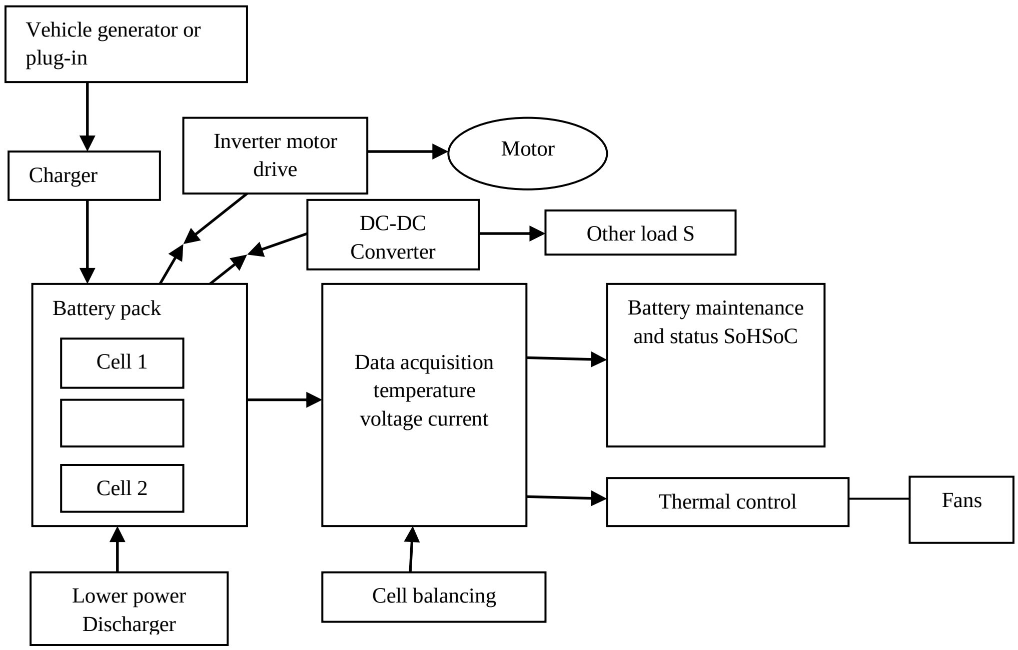

Figure:1 HEV series model.

Fig 1 clearly explains about HEV block representation; it is a combination of engine, battery, power drivers, transmission and motor. These parameters help HEV functionality efficient.

2. EV components:

The electric vehicle is easier architecture compared to conventional vehicles. The main key components are balanced in the engine and motor.

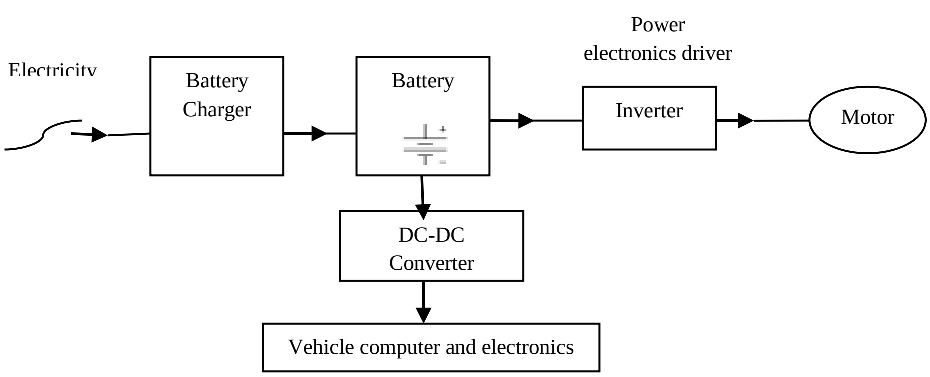

Fig 2: Key components EV.

The battery is many energy components in the electric vehicle; our main aim of this work is to balance the battery operations with inverting actions. The battery voltage DC is inverting into switching operations, so its operation enables the DC-DC conversion for 10V-25V, shown in fig.2

3. MOTOR

In this, different motors that are existing are revised based on technology i.e. DC type motor, Permenent magnet type motor, reluctance motor and brushless motor.

1. **DC type motor:**

This type of motor works based on AC functionality [4]. It is a classical type controlling the motor, which can be available with long time existence. The rotor itself converts electromechanical conversion into electricity; the low power applications can be easily accessed by this DC type motor. The many applications such as wheel chair, transportor and microcars. The acceptable energy is less than 4KW during its operation.

2. **Induction type motor**

It is an induction type motor and also it can solve many issues of high pressure applications like elevator or escalator. This induction type motor is most suitable for electric vehicles, but the energy usage is more than 5KW. Usually, torque and speed controls are derived by induction type motors; it is a good opportunity to utilize electric vehicle operations.

3. **Brushless type motor**

This is a new application type motor that contains low number of windings and poor mechanical condition. Most of the brushless DC motors are only suitable for low dynamic applications. This type of modelsare little bit cost so, we are focusing only on electric vehicles.

4. **Permanent magnetic synchronous motor**

This is nothing but an induction type motor; the entire operation is depending on pulse with modulation. The mounted and permanent induction type motors are continuously producing magnetic energy and is converted into electrical energy.

5. **Switched reluctance motor**

This is a famous and advanced motor; the decoupling mechanism can continue following the phases. At each phase, circuits are windable, this reluctance type model can be easily accessed by electric vehicles.

II. WHEEL AND DRIVE MOTOR

This drive wheel motor reduces the easy connection of shaft and reduction of transmission at clutch, gare etc. Recently the wheel type motor is promoted by a scientist for advanced electric vehicle design. The rotor turns inside and outside attached by wheel rings; these are no longer available because of drive shafts. Which are clearly shown in figure 3.

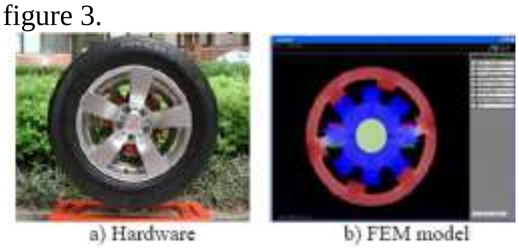

Fig 3: wheel type motor.

This motor is also called a hub motor; the main advantage of this motor is individually controlling access on 4 wheel vehicles. The anti-lock braking system provides the controlling access easily; the spinout options are much better compared to conventional. There is no standard magnetic conversion in the motor design, and fluctuations do not appear. This type of direct drive wheel motors are solving many issues faced by current technology, Which is shown in figure 4..

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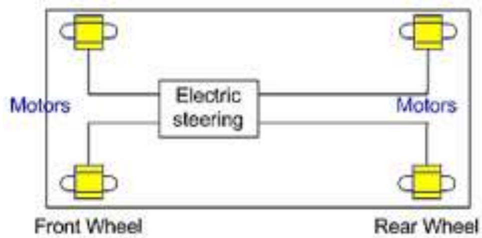

Figure 4: Four-wheel drive mechanism.

III. POWER EFFICIENCY

1. EV Batteries

The battery is the significant primary energy storage for electric vehicle design. If you need success in electric vehicle design, then we should mainly concentrate on battery life and performance. The current technology works on various battery designs, but efficient durability is not observed, so we are moving to Li-ion battery for electric vehicles. It seems that Other Li-ion such as LiCoO2, LiMn2O4 &Li(Ni1/3Mn1/3Co1/3)O2 might have the thermal and overcharge concern [10]. For a low-cost explanation, the lead-acid battery is still a dominant part of the market.

The recent technologies ROHS and NICD batteries are most suitable for advanced electric vehicle design. The trending electric vehicle technology offers fast charging and allows 200 times charging speed than available Li-ion battery. On the other hand,thesame functionality is performed by ultracapacitor technology.

2. Design of Ultra-capacitor battery.

This capacitor is capable of allowing the static components, does not involve the chemical reactions. The charging and discharging functionality is very speed, so storage of energy is very limited. Compared to available batteries this storage capacity is 20% less, the temperature and number of cycles for operation is excellent.

Table 1: Differentiation of energy storages.

Parameter	Acid	NIM	LI-ION	Ultra storage capacitor
Density of energy(Wr/kg)	50	80	120	10
Life cycle	600	900	1100	60000
temperature(◦C)	-30 ˜ +55	-45 ˜+55	-30 ˜ +65	-50 ˜ +85
Cost	1100	2.500	6.000	52000

The above table clearly explains various comparisons of storage units and their usage. In this work, the ultracapacitor type allows the regulation of storage and speed of charging within a few minutes. The implementation of the ultra storage capacitor is still in the development stage. If this design becomes available in the market, then automatically electric vehicle design cost will be less.

IV. CHARGING MECHANISM

1. Traditional charger

Every design in electric vehicle technology charging is an essential component, for speed of charging it isrequires high power and less conventional charging point system. The hybrid charging technology

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mainly depends on circuit efficiency. Here in fig 5,the efficient circuit is used for the fast charging system, which is shown in below figure 5 clearly about ANFIS mechanism.

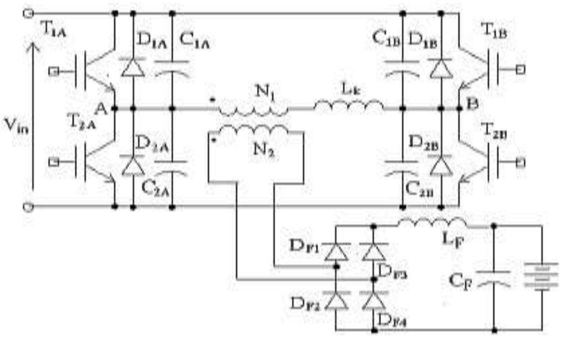

Figure 5 conversion of H-bridge ANFIS mechanism

2. Ultra-capacitor charging:

The ultracapacitor charging is a significant energy efficiency system; it is a supercapacitor that can be useful for IoT smartphones electric vehicle implementation. When the electrical application is designed, these supercapacitors can quickly improve their own operations and run the battery longer. This charging capacitor is much better than the available charging model and takes charging less than a minute.

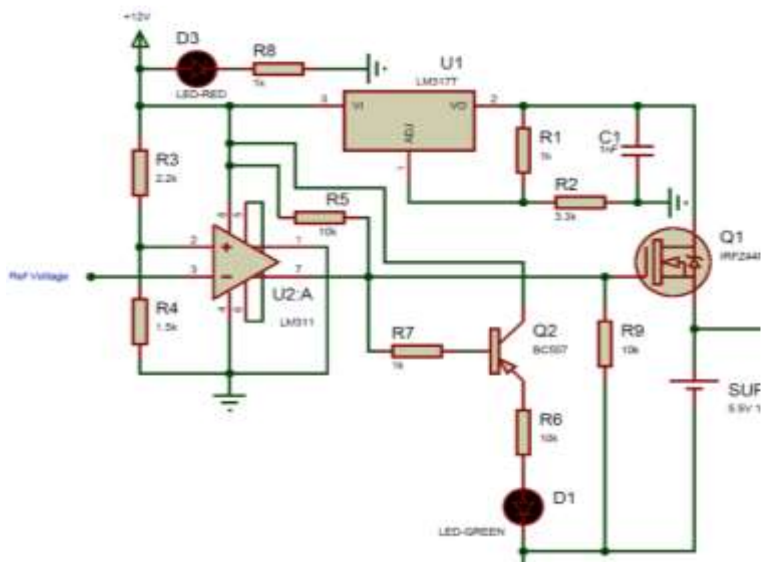

Figure 6: ANFIS Fast charging system

3. Battery usable systems

The battery usable system BUS is advanced battery management; these cells have parallel and series connections at entire network. Each cell could be monitorized by regulator technology. The conditioning and monitoring can quickly identify the voltage, current and power improvements. The two sharp parameters provide the state of art i.e. battery charging condition. This is measurable and enquiring the health conditions of the battery, which is explained below in the equation and is also shown in fig.6

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$$SoH = \frac{Nominal\ Capacity - Loss\ of\ Capacity}{\text{Nominal Capacity}} \quad (1)$$

Cell adjusting is to guarantee that every cell is working beneath a similar moulding or a guideline which is utilized to charge or release every cell by adjusting theregulator. This maintains a strategic distance from the over-burden of a specific cell shown in fig.7

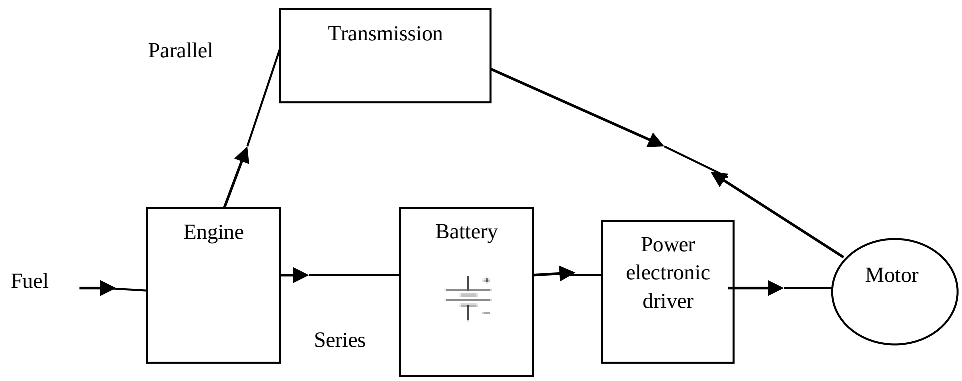

Figure 7: Schematic of BUS

4. Energy development systems

The ultracapacitor system can store the energy efficiently, the storage devices can easily access the electric vehicles with the same conditioning, and flexible design has been used in the above sections.

5.Network of charging

1. Charging network

The electrical vehicle is a network of element consisting of charging and motors. Because of uncertainty in power, electrical vehicle efficiency may decrease. Also, current charging technologies have a very shorter lifetime and the Li-ion batteries are recommended for particular instances of applications. The battery chargers availability in the electric vehicles are onboard circuits which are capable for 2.3KW single-phase power line system. For every three days of time, power consumption will diminish by 2%.

2. Fast charging

The fast charging is a robust power-adjustable technology, which considers three-phase charging station. The modern fast-charging system can increase the usability of the charging mechanism based on the following changes.

a) There is no metal contact in magnetic contactless charging system, which transfers the electricity to conductors in the electric vehicles easily.

b) The high voltage applications with three-phase sockets can be designed for 1KW electric vehicle applications.

c) The battery life has been decided by the components in the electric vehicles and controlling mechanism. The charging capacity has been decided by supply voltage chain in circuits.

V. CONTROLLING OF ELECTRIC VEHICLES

1. Power adjustments

The electric vehicles are controlling and braking maintenances only possible by integrated modules in the proposed design. The breaks mainly depend on hydraulic EV environment and electrical power generation units. In the initial stage, the power regulation is controlled by a battery and inverting system. Without optimizations of energy, safety mechanisms undergo the failures. Thus, we need to adjust the motors functionality, compensation of circuit completely. To improve the power regeneration system, we should adjust the transient analysis of VI characteristics.

2. Anti brake system

The anti breaking system plays an important role in electric vehicles, to obtain a stable and scalable operation and need to adjust the slip conditions. When the continuous slip change is observed, then PID and hydraulic pressure anti-block systems hand over the control, which is shown in figure 6.

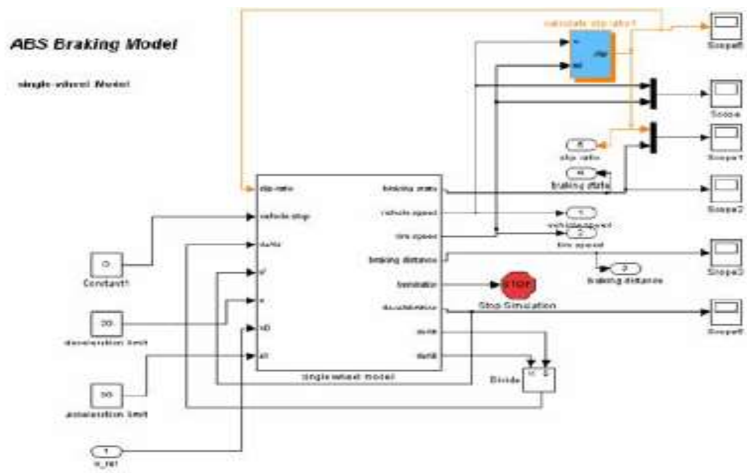

Figure:8. ABS system

The ABS development comprises a plan to extend the tire powers regardless of the states of the road. Along those traces, it has to confine the wheel slip percentage which compares to the top tire avenue grip trademark. The area and the estimation of these top esteem, shifts in huge range contingent upon the street, tire and numerous other diverse variables. For any moving conditions, the appropriate wheel slip charge, which will be utilized as manipulate reference to streamline the slowing down electricity. Fig 6 indicates the plan of ABS depending on all electrical engine power frameworks.

3. Skid Steering

In electric vehicles, the slips are adjusted by a steering mechanism. When we make a system automatic, then skid steering concept comes into the picture. The conventional methods have many limitations, so we are moving to steer the automation mechanism. The figure 8 clearly explains about different torque and different turn radius that are enquired by a proposed skid steering mechanism.

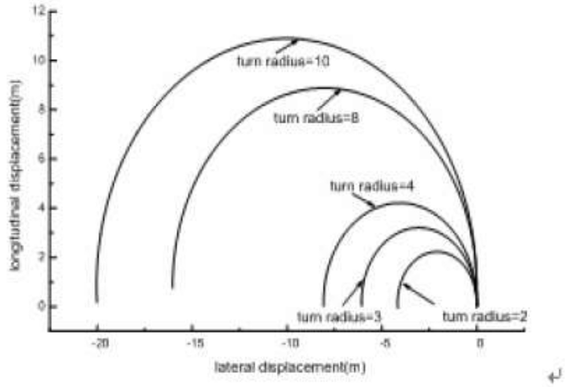

Figure :9. Skid Steering system

VI. SUSPENSION

Automobile dynamic suspension frameworks can produce and manage powers to retain avenue stuns quickly, stifle the roll and pitch movements, and enhance each protection and solace, even as keeping up the vehicle at a flat degree. For traditional aloof suspension frameworks, it is hard to be carried out, for the reason that a sensitive spring considers a variety of development and a hard spring reasons traveller misery due to road abnormalities. In this manner, the massive expansion of suspension execution is performed by the instant power direct exchange hesitance actuator. Contrasting and water-powered dynamic suspension frameworks, the created dynamic suspension framework depending on the immediate power directly transferred to hesitance actuator is less complicated because it needs much fewer gadgets and mechanical components. Because of no water-powered devices, that is a sans oil framework.

Moreover, it could contain the vitality age from the suspension. The development incorporates the structure of direct-drive directly exchanged hesitance actuator, its portrayal, and the plan of the automobile dynamic suspension framework. The converter drive is moreover anticipated to create and coordinate with the directly exchanged hesitance actuator. The power is relied upon to fit the riding instance of the suspension framework and to present suitable strength manage, vitality age manage and position manage. Fig 10 indicates a version structure of a functioning suspension framework.

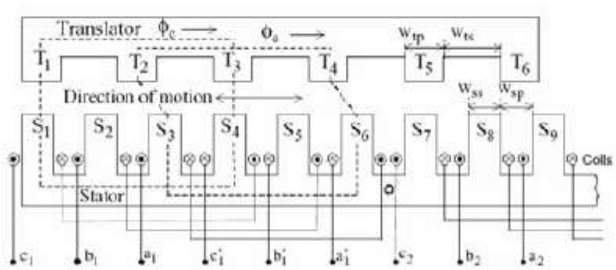

Figure:10. Switch Mechanism

VII. FINAL ELEMENTS

The front lighting fixtures framework depend on LED and Adaptive front-lights system(AFS). It is a essential protection lighting framework in motors. An AFS usefulness is partitioned into three sections, one is the headlamp leveling subsystems, which works to kept lights simultaneously interact the road surfaces. When the tilt state occurs, then static and dynamic changes automatically crosses over the distributed mechanisms in the electric vehicles. The final one is the dimming system, which blurs or

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decrease up brightening along the surrounding mild and direction circumstance modifications. Fig 9 shows an example of a LED front-light.

Figure:11. Light system

VIII. EXAMPLE ELECTRIC VEHICLES

There are different types of electric vehicles designed by available local bodies and industries. The significant designs in electric vehicles are displayed in figure 10, these are very helpful for populated countries in the world. When this type of electric vehicles are used in the daily life, then automaticallythe pollution will be controlled.

Figure:12. Example Vehicles

IX. CONCLUSION

This investigation discusses the advancements in electric vehicles and its charging operations. The motor design, battery and charging efficiency can automatically improve the electrical vehicle efficiency. This type of electric vehicles design can simplify the economy and complexity of design. The ultracapacitors, anti-lock motors and fast charging mechanism can improve the system throughput by 98% compared to previous methods. This method is challenging available electric vehicle technologies.

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