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NEW TECHNOLOGY FOR ELECTRIC VEHICLES

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Abstract – This paper provide an overview of the latest work of electric car in the region. The paper describes the development and the evaluation of one of a kind part of components. The fundamental aspects in battery technology, charger design, motor, guidance and braking are examined. The paper sooner or later shows some electric powered car prototype as a conclusion of the papers.
Keywords – ABS, battery management systems, BMS, Inverter , Electric vehicle, AFS, steering system, braking system.

I. INTRODUCTION

Electrical vehicle (EV) based on electric powered propulsion system. No inner combustion engine is used. All the energy is based on electric powered strength as the power source. The fundamental advantage is the excessive effectivity in energy conversion through its proposition machine of electric powered motor. Recently there has been big lookup and improvement work pronounced in both tutorial and industry. Commercial vehicle is additionally available. Many countries have supplied incentive to customers thru lower tax or tax exemption, free parking and free charging facilities. On the other hand, the hybrid electric vehicle (HEV) is an alternative. It has been used sizeable in the final few years. Nearly all the auto producers have at least one mannequin in hybrid electric powered vehicle. The questions come to us: Which automobile will dominate the market and which one is suitable for future? This paper is to examine the latest improvement of electric powered car and endorse the future development in the area.

II. EV AND HEV

HEV has been promoted considerably in the ultimate decade. Nearly every producer has at least one HEV in the market [1]. It is hypothetical to liberate the battery energy storage problem at that time. Using hybrid car it lets in the electric energy can be received from engine. The HEV is widely divided into sequence hybrid and series hybrid. The engine power of the sequence hybrid is linked totally to the battery. The entire the motor power is resulting from the battery. For the parallel amalgam both the engine and motor give the propulsion power. The torque is the totting up of both motor and engine. The motor is also used as a generator to absorb the electricity from engine

through the transmission. Bothe collection or hybrid can take in electricity through regeneration throughout braking or deceleration.

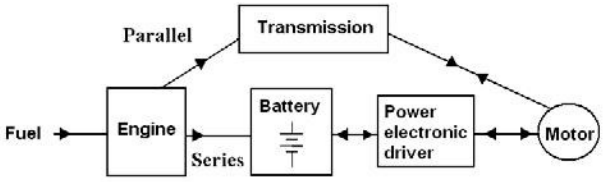

Figure 1 - The series or parallel path of an HEV

Nevertheless, HEV still has emission. The introduction of plug-in HEV that solves some of the hassle [2]. It accepts the electric energy to battery through plug in from the mains. Therefore when convenient, customers may also cost the battery the use of AC from the mains.

III. THE KEY COMPONENTS IN EV

The electric powered car is rather simple in structure. The key aspects are the propulsion parts. Fig 2 shows the configuration.

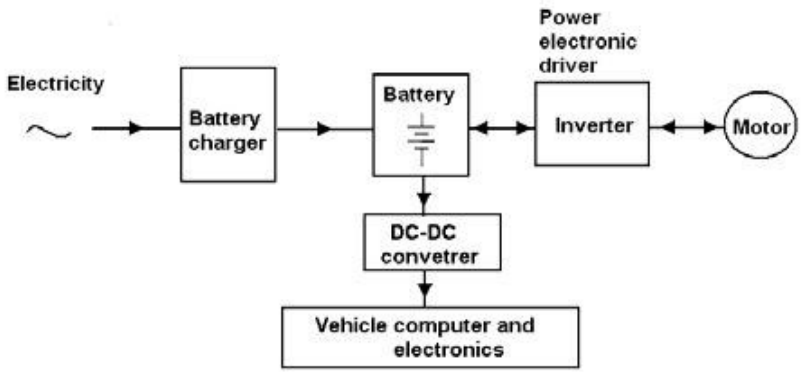

Figure 2 - The key components of an Electric Vehicle.

The battery is the most important power storage. The battery charger is to convert the electrical energy from mains to cost the battery [3]. The battery voltage is DC and I is inverted into switched-mode sign thru power electronic inverter to power the motor. The other electronic components in a vehicle can be provided to the battery thru DC-DC converter that step down the voltage from the battery pack to decrease voltage such as 5V-20V.

IV DIRECT DRIVE AND IN-WHEEL MOTOR

Direct pressure reduces the loss in the mechanical devices of the energy train. The motor is related at as soon as to the shaft to limit wants of transmission, clutch, and tools box. Recently the in-wheel motor is promoted with the aid of skill of researcher [8]. The in-wheel motor is to flip the rotor internal out and connected to the wheel's rim and the tire. There is no equipment field and pressure shaft. Fig three indicates the in-wheel motor.

3. DC brushless motor

The conventional DC motor is bad robotically due to the fact the low strength winding, the field, is stationary whilst the primary high energy winding rotates. The DC brushless motor is turned inside out [5, 6]. The high electricity winding is put on the stationary side of the motor and the area excitation is on the rotor using a everlasting magnet. The motor has longer existence time than the

DC motor but is a few times extra expensive. Most of the DC motor can be replaced through the brushless motor with appropriate driver. Presently, its functions discover in low energy EV.

4. Permanent magnetic synchronous motor

The stator is comparable to that of an induction motor. The rotor us hooked up with permanent magnets. It is equivalent to an induction motor however the air-gap filed is produced via a permanent magnet. The riding voltage is sine wave generated by means of Pulse Width Modulation (PWM).

5. Switched reluctance motor

It is a variable reluctance computer and its famous these days due to the fact of the fault tolerance due to the fact each phase is decoupled from other. The electricity stage is extraordinary from different the motor discussed in 2-4. Each phase winding is connected in a fly returned circuit fashion [7].

IV DIRECT DRIVE AND IN-WHEEL MOTOR

a) Hardware b) FEM model

Fig 3: The in-wheel motor

The motor is also referred to as wheel-hub motor. Its foremost benefit is the impartial manage of each wheel. Fig 4 shows the 4-wheele pressure vehicle. Each of the wheels works any pace and direction. Therefore the parallel barking can be done easily. The Anti-lock braking system can be applied without problems by using the technology. It has been shown that it can efficiently prevent spinout. The entire automobile is a good deal less complicated in structure. Many special types of motor can be used for in-wheel motor. The distinguished one is the switched-reluctance types. Its phase-winding is independently from each and therefore the fault tolerance is plenty greater advanced that the other. There is no permanent magnetic in the motor, it reduces any interference with the aid of everlasting discipline and the fluctuation of the everlasting magnetic materials.

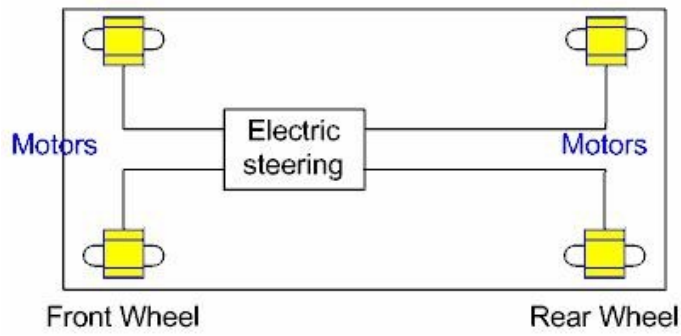

Fig. 4: True 4-wheel drive vehicle.

1. Batteries

The battery is the main electricity storage in the electric vehicle. The battery in-fact governs the success of the electric powered automobile [9]. Recently there are massive works being suggested in battery development. The battery such as Li-ion is now being used via new technology of electric powered vehicle. The hazard of the instability of the battery has been studied with the aid of many reported. It looks that the LiFePO4 type is preferable due to the fact

of its chemically steady and inherently safe. Other Li-ion such as LiCoO2, LiMn2O4 and Li(Ni1/3Mn1/3Co1/3)O2 can also has the thermal and overcharge issue [10]. For low price solution, the lead-acid battery is still dominant section of the market. The battery has determined purposes in electric powered wheel chair, Golf-cart, micro-car and regional town air. The latest RoHS has also stopped the use of NiCd battery. All the research is looking closer to the quickly charging for batteries. MIT reported [11] the technology of a crystal structure that lets in a hundred times of charging velocity than traditional Li-ion battery. Other alternative is to use ultra-capacitor.

2. Ultra-capacitor

Capacitor is essentially a static component. There is no chemical reaction in the components. Its charging and discharging speeds are very fast. However, the power storage is limited. Its power storage density is less than 20% of the lead-acid battery. Although the expected ultra-capacitor density will go up in next few years, its complete solution for major electricity storage is a challenge. The quantity of cycles and the temperature vary is excellent. Table 1 suggests the comparison.

Table 1: Comparison of different energy storage unit

	Lead-acid	NiMH	Li-ion	Ultra-capacitor
Energy density Whr/kg	40	70	110	5
Cycle life	500	8,00	1,000	500,000
Working temperature(° C)	-30 ~ +50	-40 ~+50	-40 ~ +60	-40 ~ +85
Cost $/kWhr	1,000	2,400	5,000	50,000

Therefore ultra-capacitor is useful for fast velocity or transient energy storage. As it approves high modern charging, its charging time can be shortened to within a few minutes.
The ultra-capacitor is nonetheless in the initial stage of development. It is expected that the cost will be going down and the strength density will go up hastily in subsequent few years.

V. OTHER ACCESSORIES

The the front lights device primarily based on LED and Adaptive front-lighting systems (AFS) is a crucial safety lighting system in vehicles. An AFS performance is divided into three parts, one is the headlamp leveling subsystems, which work to hold light parallel to the street surface when the vehicle's tilt country modifications in dynamic and static mode; the every other one is swiveling subsystem, which fits the mild distribution with the vehicle's turning attitude so as to produce the excellent illumination impact for driver. The last one is dimming system, which fades or dims up illumination along with the ambient mild and lane environment changes. Fig 5 suggests a pattern of an LED front-light.

Fig 5: AN LED front-lighting unit.

VI. ELECTRIC VEHICL SHOW CASES

Recently there are a quantity of neighborhood and distant places companies and establishments have been working on electric vehicle. The development on digital parts and accessories from propulsion, protection and manipulate has been reported. A neighborhood college has currently pronounced their EV development. Fig 9 indicates the personal car, security car, micro-car and motorcycle.

Fig 6: Electric vehicles developed

CONCLUSION

This paper converses the modern development in electric vehicle. The paper first describes time-honored shape and discusses the electricity storage. It then extends to the future automobile components. The paper provides an overview of the latest EV work in the region.

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