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Electric Vehicles as Future Asset

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ABSTRACT
This paper provides an overview on the importance of electric vehicles in the near future. This paper also describe the technology used in the electric vehicles and the comparison of the electric vehicles with other diesel and petrol engine vehicles with some basic diagrams.. This paper then finally ends with the conclusion.

KEYWORDS: Electric vehicles, Motor, Batteries

I. ELECTRIC VEHICLES AS

An electric vehicle (EV) is a vehicle that uses one or more electric motors or traction motors for propulsion. An electric vehicle may be powered through a collector system by electricity from off-vehicle sources, or may be self-contained with a battery, solar panels or an electric generator to convert fuel to electricity. Electric vehicles include, but are not limited to, road and rail vehicles, surface and underwater vessels, electric aircraft and electric spacecraft.Recently there has been massive research and development work reported in both academic and industry. Commercial vehicle is also available. Many countries have provided incentive to users through lower tax or taxexemption, free parking and free charging facilities.It has been used extensive in the last few years. This paper provides the information about future benefits of the electric vehicles.

II. ELECTRIC VEHICLES

EVs first came into existence in the mid-19th century, when electricity was among the preferred methods for motor vehicle propulsion, providing a level of comfort and ease of operation that could not be achieved by the gasoline cars of the time. . Commonly, the term EV is used to refer to an electric car. In the 21st century, Electric vehicles saw a resurgence due to technological developments, and an increased focus on renewable energy.. A great deal of demand for electric vehicles developed and a small core of do-it-yourself (DIY) engineers began sharing technical details for doing electric vehicles conversion. Government incentives to increase adoptions were introduced, including in the United States and the European Union.Electric vehicles are expected to increase from 2% of global share in 2016 to 22% in 2030

III. ELECTRIC MOTOR

The power of a vehicle's electric motor, as in other vehicles, is measured in kilowatts (kW). 100 kW is roughly equal to 134 horsepower , but electric motors can deliver their maximum torque over a wide RPM range. This means that the performance of a vehicle with a 100 kW electric motor exceeds that of a vehicle with a 100 kW internal combustion engine, which can only deliver its maximum torque within a limited range of engine speed.Usually, direct current (DC) electricity is fed into a DC/AC inverter where it is converted to alternating current (AC) electricity and this AC electricity is connected to a 3-phase AC motor.

For electric trains, forklift trucks, and some electric cars, DC motors are often used. In some cases, universal motors are used, and then AC or DC may be employed. In recent production vehicles, various motor types have been implemented, for instance: Induction motors within Tesla Motor vehicles and permanent magnet machines in the Nissan Leaf and Chevrolet Bolt.

Types

- DC Series Motor
- Brushless DC Motor
- Permanent Magnet Synchronous Motor (PMSM)
- Three Phase AC Induction Motors
- Switched Reluctance Motors (SRM)

Battery

An electric vehicle battery (EVB) (also known as a traction battery) is a battery used to power the electric motors of a battery electric vehicle (BEV) or hybrid electric vehicle (HEV). These batteries are usually rechargeable (secondary) batteries, and are typically lithium-

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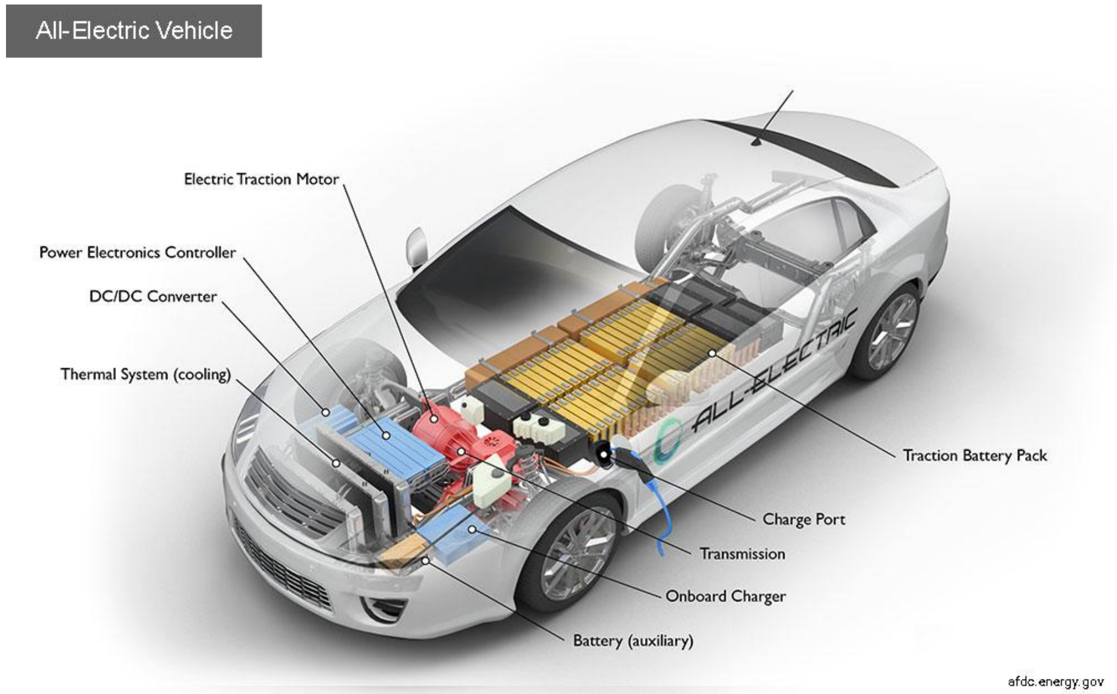
ion batteries. These batteries are specifically designed for a high ampere-hour (or kilowatt-hour) capacity. The most common battery type in modern electric vehicles are lithium-ion and lithium polymer, because of their high energy density compared to their weight. Other types of rechargeable batteries used in electric vehicles include lead–acid ("flooded", deep-cycle, and valve regulated lead acid), nickel-cadmium, nickel–metal hydride, and, less commonly, zinc–air, and sodium nickel chloride ("zebra")batteries.[1] The amount of electricity (i.e. electric charge) stored in batteries is measured in ampere hours or in coulombs, with the total energy often measured in kilowatt-hours.

How Do All-Electric Cars Work?

All-electric vehicles (EVs) have an electric motor instead of an internal combustion engine. The vehicle uses a large traction battery pack to power the electric motor and must be plugged in to a charging station wall outlet to charge. Because it runs on electricity, the vehicle emits no exhaust from a tailpipe and does not contain the typical liquid fuel components, such as a fuel pump, fuel line, or fuel tank.



IV. KEY COMPONENTS OF AN ALL-ELECTRIC CAR

Battery (all-electric auxiliary): In an electric drive vehicle, the auxiliary battery provides electricity to power vehicle accessories.

Charge port: The charge port allows the vehicle to connect to an external power supply in order to charge the traction battery pack.

DC/DC converter: This device converts higher-voltage DC power from the traction battery pack to the lower-voltage DC power needed to run vehicle accessories and recharge the auxiliary battery.

Electric traction motor: Using power from the traction battery pack, this motor drives the vehicle's wheels. Some vehicles use motor generators that perform both the drive and regeneration functions.

Onboard charger: Takes the incoming AC electricity supplied via the charge port and converts it to DC power for charging the traction battery. It monitors battery characteristics such as voltage, current, temperature, and state of charge while charging the pack.

Power electronics controller: This unit manages the flow of electrical energy delivered by the traction battery, controlling the speed of the electric traction motor and the torque it produces.

Thermal system (cooling): This system maintains a proper operating temperature range of the engine, electric motor, power electronics, and other components.

Traction battery pack: Stores electricity for use by the electric traction motor.

Transmission (electric): The transmission transfers mechanical power from the electric traction motor to drive the wheels.

V. COMPARISON BETWEEN ELECTRIC VEHICLES AND INTERNAL COMBUSTION VEHICLES

Internal Combustion Vehicle (ICV)

▪ More bang: Petrochemicals are controlled explosions that deliver a large force for a small amount of fuel and subsequently less weight in comparison to current batteries. There is less inertia to overcome when accelerating.

▪ Wasted energy: There is no way to apply the vehicle's latent momentum back into a force that can be reutilised to further accelerate without adding significant weight to the vehicle defeating the advantages of that regeneration.

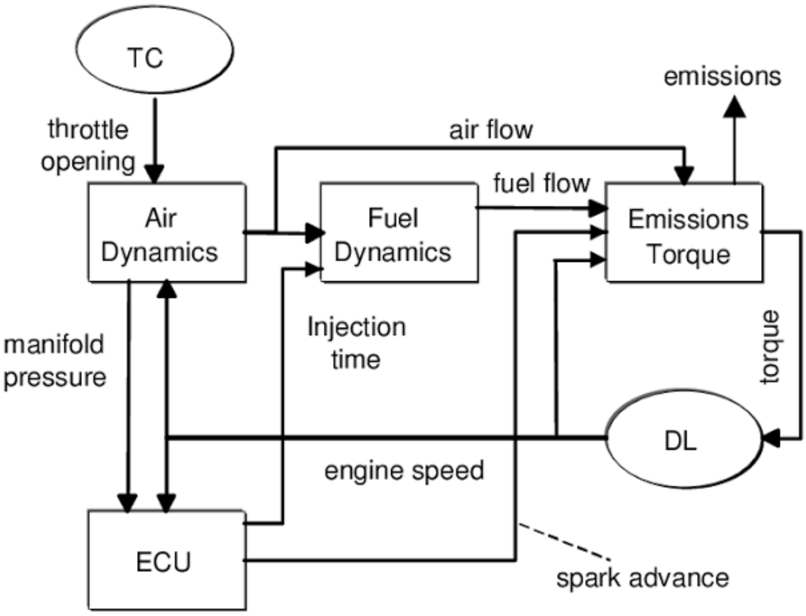
▪ Mass distribution and wasted weight. Two large mass centres: the fuel tank and engine. A heavy drive train and chassis are required to support these mass structures.

▪ Air pollution: ICVs exhaust a mixture of gases and ions that cause harm to the environment and in sufficient concentrations harm to humans directly.

▪ Refuelling: Refuelling can be achieved quickly as we have constructed an industry around providing fuel to these vehicles at various places of convenience.

▪ Hazardous chemical risk: Petrol stations are an environmental risk and a safety hazard requiring bulk storage of explosive toxic fuels.

▪ Range: Petrol fuelled vehicles have a range of 400 – 600km. 1



VI. BATTERY ELECTRIC VEHICLE (BEV)

• Mass distribution: Wheels can be driven directly with a motor at each wheel or the wheel can be the motor. The advantages of smaller masses at motor locations, where maximum force is required, allow for more freedom of design, lower centres of gravity and better handling opportunities. Flexibility in weight distribution also allows for more safety features to be built into the overall design.

• Energy conservation: Power can be regenerated using the vehicle's latent momentum during braking.

• Refuelling depots: Refuelling depots can be set up almost anywhere at low cost and can be easily utilised without the need for monitoring.

• Induction recharging: Vehicles can simply be parked over induction pads or even recharged on the move. No hazardous chemical storage required.

• Car mass: Most of the weight will be in the battery with better more efficient batteries currently being developed.

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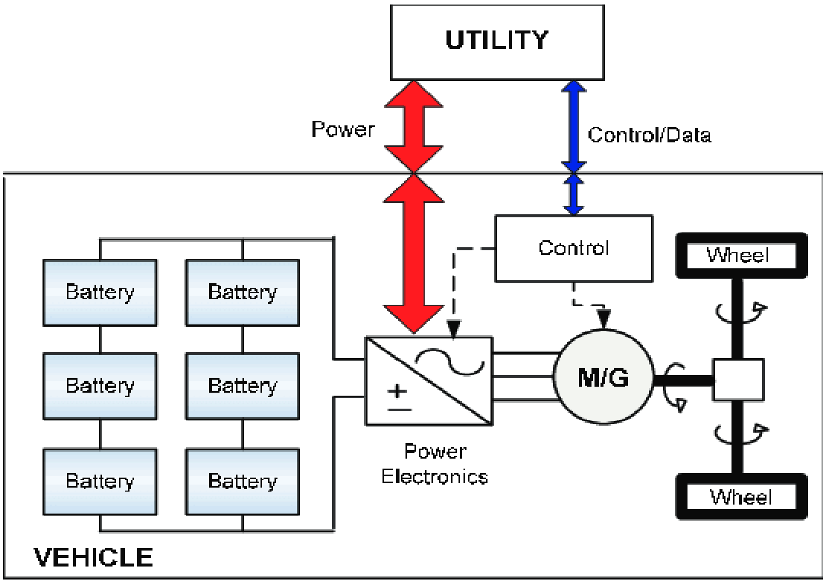
• More space in the interior: Without the two large masses present in ICVs, different designs can be constructed to utilise the space more effectively.
• Solar panelling: If stranded in remote areas, solar panels mounted in the car body allow for the vehicle to be recharged.
• Vehicle emissions: There are no gas emissions and low noise emissions in a BEV.
• Battery storage grid return: Currently, there are 18 million motor cars all over Australia. If
these were electric vehicles, you would have the most widespread mobile power storage in the world.

Current national power generation i.e. coal/gas 200-Terawatt per hour2
Power return from stored EV car batteries 6375-Terawatt per hour
Based on 85kw storage per MV X 18 Million EV take up vs ICV (efficiency gains with shorter transmission distances not included)
▪ Range: BEVs can have a range of 450km.
• Fast charge: currently 1 hour for 450km of range but with minimal development could be
equivalent to that of petrol vehicles.



VII. CONCLUSION

This paper discusses about the future technology in electric vehicles and the working of the electric vehicles. It then describes the parts and process used in the electric vehicles. Later this paper compares the electric vehicles with normal internal combustion engine vehicles with the block diagrams.

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