

Electric Vehicle Wire Harnessing

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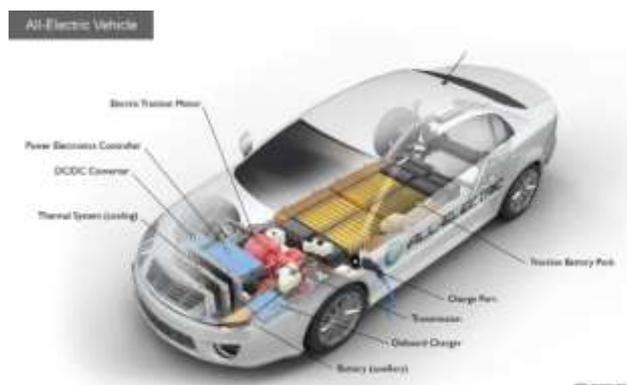
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Abstract - An Electric Vehicle (EV) model is developed to study the design, operation, and performance of electric vehicles. Electric vehicles use electrical energy stored in batteries instead of conventional fuel. The main components of an EV model include a battery pack, electric motor, motor controller, power converter, and charging unit. The controller regulates the speed and torque of the motor according to the driver's input.

The electric motor converts electrical energy into mechanical energy to drive the wheels. EV models help in analyzing the efficiency, speed control, and energy consumption of electric vehicles. They are widely used in research and education to understand the working principles of EV technology.

1. INTRODUCTION

An Electric Vehicle (EV) is a type of vehicle that uses electrical energy for propulsion instead of conventional fuels such as petrol or diesel. In recent years, electric vehicles have gained significant importance due to increasing fuel prices, depletion of fossil fuels, and growing environmental concerns. Traditional vehicles produce harmful gases such as carbon dioxide and other pollutants and global warming. Electric vehicles help reduce these emissions and promote cleaner transportation.



The EV model is developed to study and understand the basic construction and working principle of electric vehicles. It demonstrates how electrical energy stored in the battery is used to drive the vehicle. The main components of an EV model include a battery pack, electric motor, motor controller, power converter, and charging system. The battery acts as the main energy source and stores electrical energy. This energy is supplied to the electric motor through the motor controller.

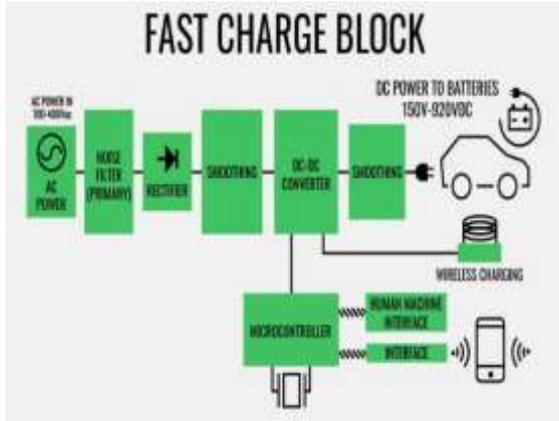
The motor controller regulates the speed and torque of the motor based on the driver's input. The electric motor converts electrical energy into mechanical energy, which is used to rotate the wheels of the vehicle. The charging system is used to recharge the battery from an external power supply. Some electric vehicles also use regenerative braking systems, which help recover energy during braking and store it back in the battery.

2. WORKING PRINCIPLE

The working principle of an Electric Vehicle (EV) is based on the conversion of electrical energy into mechanical energy. In an EV model, the battery acts as the main source of electrical energy. The battery stores electrical energy and supplies it to the motor through a motor controller.

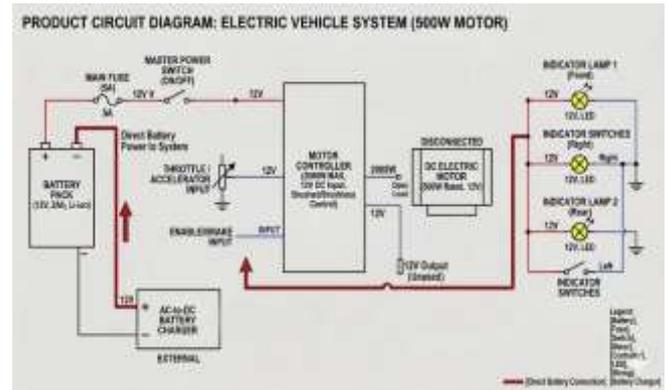
The speed of the vehicle is controlled by varying the power supplied to the motor through the controller. Some EV systems also include regenerative braking, which converts the kinetic energy of the moving vehicle back into electrical energy during braking and stores it in the battery.

3.BLOCK DIAGRAM.



- i. AC Power Supply: AC power (100–400 V) is taken from the electrical grid.
- ii. Noise Filter (Primary): Removes electrical noise and disturbances from the AC supply to protect the circuit.
- iii. Rectifier: Converts AC power into DC power.
- iv. Smoothing Circuit: Filters the pulsating DC and provides smooth DC output.
- v. DC–DC Converter: Converts the DC voltage to the required battery charging voltage level.
- vi. Smoothing (Output Filter): Again filters the DC to ensure stable DC supply for the battery.
- vii. Battery Charging (DC Power to Battery): The controlled DC power (about 150–920 V DC) is supplied to charge the EV battery.
- viii. Microcontroller: Controls charging process, monitors voltage, current and safety conditions.
- ix. Human Machine Interface (HMI): Allows the user to monitor and control charging through display or mobile interface.
- x. Wireless/Communication Interface: Enables wireless monitoring and control of charging through smartphone or network.

4.CIRCUIT DIAGRAM



1. Battery supply:

Battery pack supplies DC power to the EV system.

2. Protection:

The main fuse protects the circuit from over-current or short circuit.

3. Power ON:

When the master power switch is turned ON, power flows to the controller.

4. Throttle input:

The accelerator (throttle) sends a signal to the motor controller to control speed.

5. Controller operation:

The motor controller regulates voltage and current supplied to the motor.

6. Motor rotation:

The DC motor converts electrical energy into mechanical energy and starts rotating.

7. Vehicle movement:

The motor drives the wheels, which moves the vehicle forward.

8. Battery charging:

When needed, the AC-DC charger converts AC supply into DC to recharge the battery.

5. TYPES OF EV

i. Battery Electric Vehicle (BEV)

- Runs only on battery and electric motor.
- No petrol or diesel engine.
- Battery is charged using electricity.

ii. Hybrid Electric Vehicle (HEV)

- Uses both petrol engine and electric motor.
- Battery is charged by the engine and regenerative braking.

iii. Plug-in Hybrid Electric Vehicle (PHEV)

- Similar to HEV but battery can be charged by external power supply.
- Can run some distance only on electricity.

iv. Fuel Cell Electric Vehicle (FCEV)

- Uses hydrogen fuel cell to produce electricity.
- Water is the only emission.

5. COMPONENTS

1. Motor 500w

2. Motor Controller 2000w

3. Battery 12v 12A

4. Indicator 2

5. Wiring

6. Switch

7. Wheels

8. Headlight

1. Motor



A DC motor is an electrical machine that converts direct current (DC) electrical energy into mechanical energy in the form of rotation.

A DC motor works on the principle of Lorentz Force. According to this principle, when a current-carrying conductor is placed in a magnetic field, it experiences a mechanical force. This force causes the conductor to move, which results in rotation of the motor.

2. Motor Controller

A motor controller is an electronic device used to control the operation of an electric motor. It regulates the speed, torque, direction, starting, and stopping of the motor. In electric vehicles and other motor-driven systems, the motor controller acts as an interface between the power source and the motor. It controls the amount of electrical power supplied to the motor according to the required when a current-carrying conductor is placed in a magnetic field, it experiences a mechanical force. This force causes the conductor to move, which results in rotation of the motor.

Motor controllers are widely used in electric vehicles, industrial drives, robotics, pumps, fans, and conveyor systems. They help improve efficiency, performance, and reliability of motor operation.

3. Battery



The working of a battery is based on the principle of Electrochemical Reaction. When the battery is connected to an external circuit, a chemical reaction takes place inside the cell. This reaction causes the flow of electrons from the anode to the cathode through the external circuit, producing electric current.

4. Indicator



An indicator is a device used to show the operating status or condition of a system or circuit. It gives a visual signal to indicate whether a device is ON, OFF, charging, or faulty.

6.PROBLEM STATEMENT

Electric vehicles are developed to reduce air pollution and dependence on fossil fuels. However, there are several problems associated with EV technology. One major issue is the limited driving range of the battery, which restricts long-distance travel. Another problem is the high cost of batteries, making EVs more expensive than conventional vehicles. The charging time of EV batteries is also longer compared to refueling petrol or diesel vehicles.

7.CONCLUSION

Electric vehicles are an important solution for reducing air pollution and dependence on fossil fuels. They use electrical energy stored in batteries to run the motor, which makes them environment-friendly and energy efficient. EVs also have low operating cost and less maintenance compared to conventional vehicles

Therefore, electric vehicles play a major role in the future of sustainable transportation and help in creating a clean and green environment.

8.REFERENCE

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