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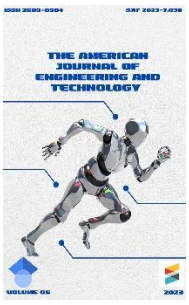

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Research Article

UNDERSTANDING THE IMPLEMENTATION OF HUB MOTORS IN ELECTRIC CARS

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ABSTRACT

The implementation of hub motors has revolutionized electric cars functionality by integrating electric motors directly into the wheels. Although this design innovation brings numerous advantages to modern-day automobiles including increased fuel economy and a reduction in carbon emissions, it is essential to understand its potential limitations. This paper examines how hub motor technology transforms automotive engineering while exploring potential drawbacks like imbalance issues arising from changing weight distribution. Electric vehicles are evolving rapidly due to increased investment by governments and energy companies worldwide to decarbonize road transport systems. A key component of electric vehicles that impacts their performance is the type of motor used.

KEYWORDS

Road transport systems, Hub motors, advanced technology and engineering principles, Voltage control panel, Integration chip

INTRODUCTION

Hub motors – which integrate the motor directly into the wheels – offer several advantages over conventional engines but also bring challenges that must be overcome through ongoing research. As society continues to search for more sustainable means of transportation, many are looking towards electric vehicles as a viable solution - including those that incorporate innovative features like hub motors. By leveraging advanced technology and engineering principles, these types of electric motors offer

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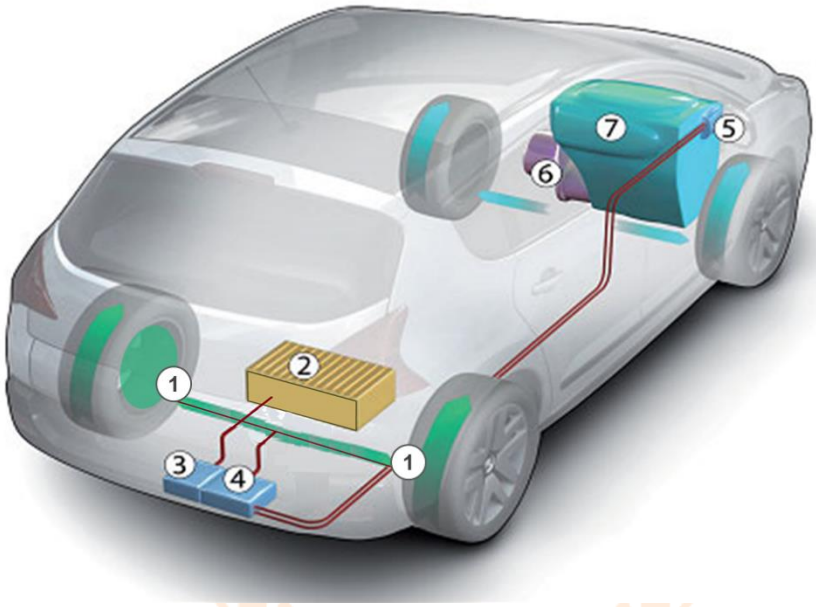
significant advantages over conventional ones. That being said, there remain pertinent challenges when integrating them into an automobile's framework - such as ensuring proper weight balance and reviewing impact on suspension systems. Upon its invention in the waning moments of the nineteenth century, hub motor technology initially saw negligible utilization in terms of large-scale electrified transport applications before finally entering widespread use approximately one-hundred years later during what became known as "the decade of disruption." The chief asset offered by this system over its conventionally-powered counterparts is vastly improved efficiency resulting from its lack of gears or differentials; consequently minimizing mechanical loss while reducing dissipative energy output as well.



1. Hub electric motors
2. Constant voltage battery
3. Voltage control panel
4. Integration chip
5. Start and Stop control
6. Transmission box
7. Internal combustion engine

Fig.1. An additional drive electric motor for transferring vehicles to a hybrid system

The goal of the research work is gradual transformation of traditional vehicles into a hybrid system with the help of innovative and advanced technologies.

That is, this research is aimed at the production and commercialization of equipment and machinery for turning internal combustion engine cars into hybrid cars. In this way, we achieve a reduction in fuel consumption and emissions without affecting safety.

Solving the current problems of fuel shortage and ecology. In short, the use of alternative, that is, electricity instead of gasoline and compressed natural gas fuel in our national vehicles. The technology used

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can be applied to most of the existing domestic vehicles, especially front-wheel drive vehicles.

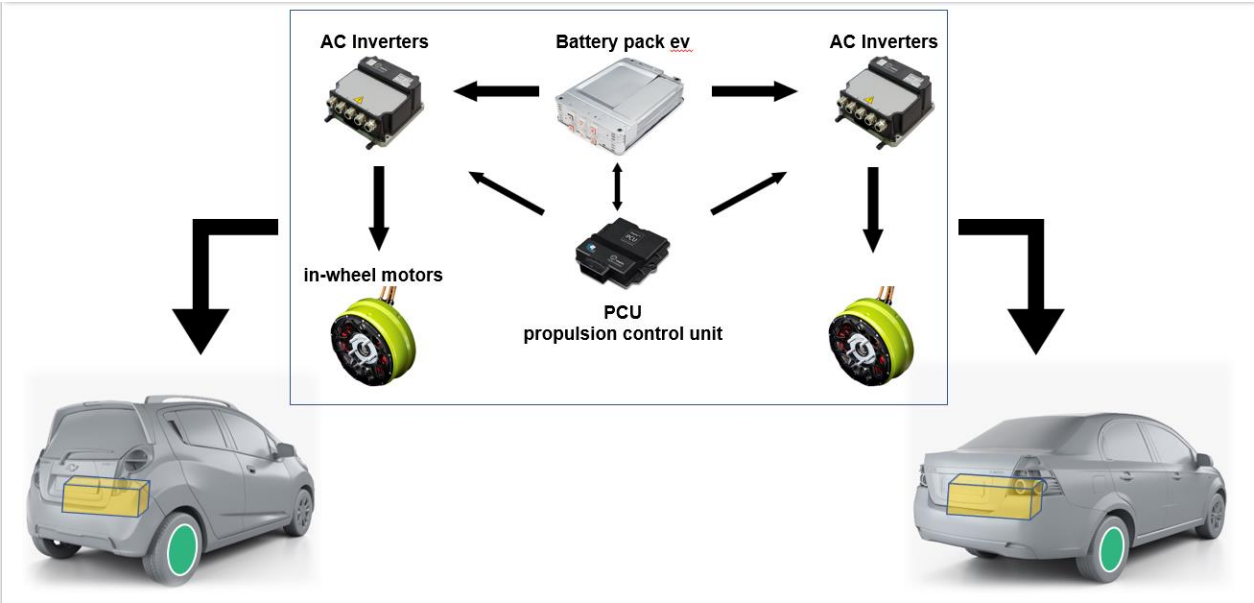

Fig.2. Technology of additional drive electric motor for transferring vehicles to a hybrid system

Ancillary to this reduction is that it simplifies vehicle body make while doing away with prominent transmission requirements required in other designs- simultaneously providing increased maneuverability due to refined torque management which can be executed on a wheel-by-wheel basis. Despite their numerous benefits, incorporating hub motors into electric vehicles presents substantial difficulties for the suspension system design. Specifically, increasing the unsprung weight through a hub motor installation has adverse effects on both ride smoothness and driving habits.

Furthermore, heavy loads at individual wheels can cause undue wear and tear over time for key suspension parts like shocks or supports. Nevertheless, automobile researchers are determined to address these challenges by delving into adaptive suspensions or lighter construction materials. Electric vehicles equipped with hub motors often face difficulties regarding how it affects their weight distribution. For instance, when positioned on wheels, hub motors increase weight and could alter a vehicle's center of gravity leading to decreased stability when driving. Several automobile manufacturers have adopted diverse solutions including mounting wider hubs close to the center point or utilizing alternative technologies for ensuring equilibrium within their respective models. Nevertheless, despite these challenges, makers continue capitalizing on leveraging benefits posed by such type motor systems which include offering improved traction through features like all-wheel drive capability and efficient handling under varying road scenarios through torque vectoring.

Regenerative braking has been made possible in electric vehicles through the utilization of hub motors, which contributes to improved energy efficiency during deceleration. A prime example of this technology is seen in Tesla's Model S Plaid, wherein a tri-motor system comprising one front and two rear hub motors provide exceptional all-wheel drive and

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torque vectoring. Hub motors offer several benefits for electric vehicles such as better efficiency, simplified design features which lead to increased maneuverability. Nonetheless, integrating these engines into EV design still poses multiple difficulties that need to be addressed; such as how the suspension system is affected by these engines and how they impact the weight distribution of a vehicle. Hence researchers today work towards finding innovative solutions like adaptive suspension systems or incorporating lighter materials in order to minimize their adverse effects on EVs. The automotive industry is experiencing an era of transformation thanks to technology advancements.

CONCLUSION

Hub motors have emerged as one of the primary drivers behind this change, becoming indispensable in driving sustainable transportation initiatives through green energy sources.

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