MOTION WIND HARVEST USING A SERIES OF HELICAL BLADES FOR ELECTRIC POWER

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Introduction:

The increasing demand for sustainable and energy-efficient transportation has driven innovation in the field of electric vehicles (EVs). While EVs offer a cleaner alternative to traditional combustion engines, their reliance on external charging infrastructure remains a challenge. This project proposes a novel onboard wind energy harvesting system designed to generate supplementary power during vehicle motion. By integrating helical turbine blades within a streamlined pipe housing, the system captures and converts wind energy produced by the vehicle's own movement into electrical energy. This not only extends the battery range of EVs but also reduces dependency on external power sources, thereby promoting a self-sustaining and eco-friendly mobility solution. The project emphasizes compact design, aerodynamic efficiency, and practical implementation, with the potential for further development and patentability.

Objectives:

1. To design and develop a compact helical-blade turbine system capable of capturing wind energy generated during the motion of electric vehicles.

2. To create a streamlined pipe housing that effectively channels airflow while minimizing aerodynamic drag.
3. To optimize the energy conversion efficiency of the turbine and generator system.
4. To fabricate a functional prototype using lightweight materials and 3D printing technology.
5. To conduct wind tunnel testing and real-world trials to assess system performance under various driving conditions.

Methodology:

- Design the helical turbine blades and pipe housing using 3D modeling software.
- Fabricate a scaled-down model of the pipe housing and helical turbine using lightweight materials.
- Assemble the turbine, generator, and a small battery system to test energy conversion.
- Conduct controlled wind tunnel tests to measure energy output under various airflow speeds.
- Install the prototype on a vehicle and test it under real-world driving conditions.
- Record parameters such as energy generated, battery charging efficiency, and impact on vehicle drag.
- Document the project's findings, challenges, and recommendations for future scalability and adoption.

Result and Conclusion:

Expected Results:

- A functional prototype of an onboard wind energy harvesting system integrated into an electric vehicle.
- Successful demonstration of supplementary energy generation during vehicle motion using helical turbine blades housed inside a streamlined pipe.
- Improved energy efficiency and extended battery range in EVs by partially charging the battery while the vehicle is in motion.

- Experimental data supporting the feasibility of using vehicle-induced wind as a renewable energy source.
- Minimal impact on vehicle drag due to the optimized aerodynamic design.
- Potential for further scaling and integration into commercial electric vehicle systems.

Conclusion:

This project aims to present an innovative approach to enhancing electric vehicle efficiency by harvesting wind energy generated during motion. By combining smart aerodynamic design and renewable energy technology, the proposed system offers a supplementary power source that reduces reliance on external charging infrastructure. The successful implementation and testing of this system will not only contribute to eco-friendly mobility solutions but also open pathways for future research, optimization, and patentable innovations in sustainable transportation.

Future Scope:

The future scope of this project includes:

Design Optimization:
Improve blade shape, generator output, and materials to enhance efficiency and reduce drag.

EV System Integration:
Integrate with the vehicle's battery system for smarter energy management.

Scalability:
Adapt the system for larger EVs like buses and trucks for higher energy generation.

Hybrid Energy Use:
Combine with solar panels for a dual renewable energy system.

Commercial Potential:
Patent and develop the system for commercial use in future EV models.

Smart Control:
Add sensors to adjust turbine function based on speed and airflow.