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## Patent Search

Invention Title	DEEP LEARNING BASED APPROACH TO PREDICT FUEL CONSUMPTION AND MAINTENANCE COST OF HEAVY-DUTY VEHICLES WHILE USE AND ALTERNATIVE FUELS
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#### Abstract:

The presented invention introduces a Deep Learning-based Approach for Predicting Fuel Consumption and Maintenance Costs in Heavy-Duty Vehicles utilizing Diesel Alternative Fuels. This innovative system combines data collection, preprocessing, and a sophisticated deep learning model to provide real-time predictions and preventive maintenance recommendations. By accurately forecasting fuel consumption and maintenance expenses under varying conditions, this invention offers a practical solution to enhance the efficiency and sustainability of heavy-duty vehicle operations, reducing costs and minimizing unplanned downtime.

#### Complete Specification

Description: The present invention relates to the field of transportation and vehicle management, particularly in heavy-duty vehicle fleets powered by various fuels, including diesel and alternative fuels. More specifically, the invention pertains to the application of deep learning techniques for the prediction and optimization of fuel consumption and maintenance costs in heavy-duty vehicles, thereby enhancing the efficiency, cost-effectiveness, and environmental sustainability of such vehicles in commercial and industrial settings.

#### BACKGROUND OF THE INVENTION

The following description of related art is intended to provide background information pertaining to the field of the disclosure. This section may include certain aspects of the art that may be related to various features of the present disclosure. However, it should be appreciated that this section be used only to enhance the understanding of the reader with respect to the present disclosure, and not as admissions of prior art.

Heavy-duty vehicles, such as trucks, buses, and industrial machinery, play a vital role in modern transportation and logistics. They are the backbone of industries that rely on the efficient movement of goods and materials. However, these vehicles are also known for their substantial fuel consumption and maintenance costs, which significantly impact operational expenses and environmental sustainability.

#### 1. Fuel Consumption Challenges

The fuel consumption of heavy-duty vehicles, particularly those powered by diesel engines, has long been a concern. Diesel fuel, while providing high energy density

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