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## Patent Search

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### Abstract:

The present invention proposes an asymmetrical multilevel inverter with optimized DC source utilization for electric vehicle drive applications. The system employs  $n$  unequal DC sources and a reduced number of switches to generate a high number of voltage levels, resulting in improved power quality and reduced harmonic distortion. The optimized topology minimizes total standing voltage across switches, thereby reducing device stress and enhancing system efficiency. The inverter is controlled using modulation techniques to produce a near-sinusoidal output suitable for electric vehicle motors. The proposed design offers advantages such as reduced component count, improved efficiency, scalability, and compatibility with renewable energy sources. This makes the system highly suitable for modern electric vehicle applications and energy systems.

### Complete Specification

Description: The proposed system consists of the following key components:

#### 1. Asymmetrical DC Sources

Multiple DC sources of unequal voltage magnitudes are used to achieve higher voltage levels. These sources may include batteries, supercapacitors, or renewable energy sources.

#### 2. Power Semiconductor Switches

A reduced number of switches are arranged in a novel configuration to generate multiple voltage levels. The switches operate under optimized gating signals to minimize switching losses.

#### 3. Gate Driver Circuit

The gate driver circuit provides appropriate triggering signals to the power switches based on the selected modulation strategy.

#### 4. Control Unit

A microcontroller or DSP-based controller generates switching pulses using advanced modulation techniques such as PWM or nearest level control (NLC).

#### 5. Load (EV Motor Drive)

The inverter feeds an electric motor, such as an induction motor or BLDC motor, used in electric vehicle propulsion systems.

Working Process

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