**AI-Driven Real-Time Power Distribution in Renewable Energy-Based Smart Grid EV Charging**

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**Abstract:**

The increasing adoption of electric vehicles (EVs) necessitates an intelligent and adaptive power distribution strategy to ensure grid stability while maximizing renewable energy utilization. This paper proposes an AI-driven real-time power distribution framework for EV charging stations integrated with a renewable energy-based smart grid. The framework leverages reinforcement learning (RL) and deep learning models to dynamically allocate power based on real-time demand, grid constraints, and renewable energy availability. By predicting charging demand patterns and optimizing power distribution, the proposed approach minimizes grid overload, reduces reliance on fossil fuel-based energy sources, and enhances overall charging efficiency. Simulation results demonstrate the effectiveness of the model in balancing grid stability, user convenience, and energy sustainability. This study contributes to the advancement of AI-enabled smart grids by showcasing a robust and scalable power distribution mechanism tailored for future energy ecosystems.

**Keywords:** AI-driven power distribution, smart grid, renewable energy integration.