

Fast Charging Technologies and Thermal Management in Electric Vehicles

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Abstract: *In this research paper, we investigate the evolving landscape of fast charging technologies and their relationship with thermal management systems in electric vehicles (EVs). With the rapid adoption of EVs, addressing charging time concerns has become critical for enhancing user experience and promoting sustainable mobility. Utilizing a mixed-methods approach, we collected quantitative data from a structured survey of 200 EV owners and potential buyers, complemented by qualitative insights from in-depth interviews with industry experts. The findings indicate a strong preference for faster charging, with 45% of respondents favoring charging times of 0–30 minutes. Moreover, the study reveals that while 55% of participants are aware of thermal management technologies, satisfaction levels with existing solutions remain moderate. This highlights the need for advancements in thermal management to optimize battery performance and lifespan. Additionally, challenges such as battery degradation and infrastructure limitations are discussed, emphasizing the importance of collaboration among stakeholders in the automotive and energy sectors. Overall, this research provides valuable insights for enhancing charging technologies and improving the overall EV ownership experience.*

Keywords: Charging Technologies, Electric Vehicles, Safety, Performance, Battery Health, Cooling Strategies and Ecosystem etc