

Smart Kumbh Guide

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Abstract: *The Kumbh Mela is among the largest religious gatherings globally and poses complex challenges related to crowd regulation, public safety, infrastructure capacity, and effective resource management. The presence of millions of pilgrims within a restricted geographical area often places immense pressure on conventional management practices, highlighting the need for innovative and technology-enabled solutions. The application of smart technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and Big Data analytics offers transformative potential for enhancing operational efficiency, situational awareness, and sustainability in large-scale events.*

This study investigates the contribution of digital infrastructure to the management of the Kumbh Mela, with particular emphasis on AI- and IoT-based systems for crowd monitoring, traffic regulation, and emergency preparedness. Policymakers' perspectives on the adoption of smart governance frameworks for mega-events are also examined. A mixed-method research design was adopted, integrating quantitative survey techniques with qualitative interviews to obtain comprehensive insights. Primary data were collected from pilgrims, event management authorities, law enforcement personnel, technology providers, and government representatives through structured questionnaires and semi-structured discussions.

Focusing on the 2025 Kumbh Mela in Prayagraj, India, the research evaluates key smart management components, including real-time crowd observation, intelligent emergency response systems, smart sanitation infrastructure, AI-enabled security analytics, and digital traffic management solutions. The study aligns with Sustainable Development Goals (SDGs) 3, 6, 9, and 11 by promoting public health, sanitation, resilient infrastructure, and sustainable urban development. Quantitative findings were analyzed using statistical software tools, while qualitative data were examined through thematic analysis. The results demonstrate that AI-driven surveillance, IoT-based crowd density assessment, smart waste management, and real-time mobility tracking significantly improve safety, coordination, and operational efficiency. Moreover, predictive analytics support proactive planning by anticipating crowd surges, strengthening emergency services, and optimizing the distribution of essential resources. Overall, the study concludes that the integration of smart technologies enables a safer, more organized, and environmentally sustainable Kumbh Mela while reducing logistical complexities..

Keywords: Smart Event Management, Kumbh Mela, Internet of Things, Artificial Intelligence, Big Data Analytics, Crowd Management, Sustainable Infrastructure

