

Smart Cities: Definitions, Architectures, Technologies, Life Cycle, Domains, Challenges, Opportunities, and the Case of Amman

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ABSTRACT

The concept of Smart Cities (SCs) has attracted significant global interest in recent years, as urban areas seek innovative ways to enhance residents' quality of life and promote environmental sustainability. The SC paradigm represents a forward-looking approach to urban development, leveraging advanced technologies to build more efficient, livable, and resilient cities. This growing interest is fueled by rapid advancements in Information and Communication Technologies (ICT), which have enabled everyday objects and systems to operate more intelligently, streamlining urban services and daily life. As cities evolve into next-generation SCs, it becomes crucial to examine their key components—ranging from definitions, architectures, and enabling technologies to application domains, implementation challenges, research opportunities, and real-world case studies. This article explores these dimensions comprehensively, offering a synthesis of existing SC definitions and presenting a new definition proposed by the author. It introduces a structured eight-phase Smart City Development Life Cycle (SCDLC), reviews current architectures and technologies, and categorizes the primary domains where smart solutions

are applied. Highlighting the leading smart cities of 2025, the paper also provides an in-depth case study of Amman, Jordan, and concludes with a discussion of key insights drawn from the overall study.

Keywords: Smart Cities (SCs), Information and Communication Technologies (ICT), Smart City Technologies, Smart City Challenges, Smart City Development Life Cycle (SCDLC), Internet of Things (IoT), Artificial Intelligence (AI), Smart Buildings, Urban Sustainability, Amman City, Systematic Literature Review.

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