

Chapter 4

Geospatial Technologies for Smart Cities

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ABSTRACT

Geospatial technologies, both traditional and modern technologies, have changed the way spatial data is collected, stored, processed, analyzed, and visualized for decision-making in Smart cities. Popular geospatial technologies are geospatial information systems (GIS), remote sensing, and global positioning systems (GPS). Computing technologies have undergone rapid development in recent times. Artificial Intelligence (AI), the Internet of Things (IoT), Big Data, and others are used alongside geospatial technologies for improved decision-making by city planners and administrators. These technologies help Smart cities offer various services to the citizens, promote a circular economy, and be sustainable. Real-time data processing and predictive analytics help proactively manage infrastructure, optimize resource allocation, and enhance overall urban resilience. The chapter is novel in its comprehensive overview of geospatial technologies and data in smart cities, integrating both traditional and modern technologies and emphasizing the significance of geospatial data visualization.

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1. INTRODUCTION TO GEOSPATIAL TECHNOLOGIES IN SMART CITIES

1.1 Defining Smart Cities

Smart cities (SCs) reflect an evolutionary approach to urban growth and are considered a new form of traditional cities (Marzouk & Othman, 2020; Zhou et al., 2021). By using advanced technologies, SCs are undergoing digital transformations. They can provide personalized and accessible services to citizens, thereby improving the satisfaction and well-being of their citizens. Because the definition of Smart cities changes based on social, technical, and cultural perspectives, there is no universal definition. Figure 1 shows the logical progression of a city (Petrov et al., 2024). Smart Cities optimize urban infrastructure efficiency, promote sustainable economic growth, and build a circular economy. These cities integrate knowledge from multiple domains to create an interconnected and intelligent urban environment (Rani et al., 2021). This information remarkably improves decision-making in transportation, energy usage, waste management, health, public safety, and quality of education and governance. These cities have to move from being digital to sustainable (Zheng et al., 2020) and consequently need to zero net carbon emissions, reduce energy consumption, improve operational efficiency, address the pressing challenges of rapid urbanization and climate change, and enhance the quality of life (Sánchez et al., 2024).

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