


Chapter 13


The Threat Landscape of Smart Urban Ecosystems: A Survey

Mohammad Albadareen

 <https://orcid.org/0009-0008-3034-7693>


Hashemite University, Jordan

Abdullah Al-Husseyney

 <https://orcid.org/0009-0002-6061-4875>

Hashemite University, Jordan

Mahmoud Aljawarneh

 <https://orcid.org/0000-0003-2003-6310>

*Applied Science Private University,
Jordan*

Qais Al-Na'amneh

*Applied Science Private University,
Jordan*

Fadi Batah

 <https://orcid.org/0009-0001-8080-9429>

*Applied Science Private University,
Jordan*

Ahmad saleh Alhazaimeh

*King Abdaulaziz University, Saudi
Arabia*

Rahaf Hazaymih

*Jordan University of Science and
Technology, Jordan*

ABSTRACT

The digital transformation of cities into smart urban ecosystems creates a vast and complex cybersecurity attack surface. This paper provides a foundational survey of this threat landscape, systematically deconstructing the smart city's anatomy from a security perspective. We analyze inherent vulnerabilities within key technologies like IoT, 5G/6G, AI, and cloud/edge computing. The survey presents a multi-dimensional taxonomy of threats, classifying them by attacker intent, target asset, and vector, while examining domain-specific vulnerabilities in transportation, energy, and healthcare. A forward-looking analysis of emerging threats is also provided. The

DOI: 10.4018/979-8-3373-4455-3.ch013

objective is to establish a comprehensive, structured understanding of the threats themselves, offering an essential baseline for researchers, practitioners, and policymakers dedicated to securing the cities of tomorrow.

1 INTRODUCTION

The 21st century is defined by an inexorable shift towards urbanization, a trend that places immense pressure on city infrastructure, resources, and governance models. In response, municipalities worldwide are embracing the paradigm of the smart urban ecosystem, leveraging information and communication technologies (ICT) to fundamentally reimagine city operations and enhance the quality of urban life (Hollands, 2020). This transformation is driven by pressing socio-economic needs: the demand for sustainable energy consumption, the necessity of efficient and multimodal transportation, the call for more responsive public services, and the imperative to ensure public safety in increasingly dense population centers. The smart city, therefore, is not merely a technological pursuit but a strategic response to the core challenges of modern urban living.

These ecosystems are built upon a sophisticated, layered architecture of sensors, networks, data platforms, and applications, all powered by a convergence of powerful technologies. The Internet of Things (IoT) forms the nervous system, with billions of sensors collecting real-time data on everything from traffic flow to air quality. High-speed communication networks, particularly 5G and the forthcoming 6G, provide the ubiquitous connectivity essential for processing this data deluge. Artificial Intelligence (AI) and Machine Learning (ML) act as the brain, analyzing patterns to optimize services, predict failures, and automate decisions (Meijer & Bolívar, 2016). While this digital evolution offers immense benefits, it intrinsically introduces a complex and expanding array of cybersecurity risks. The very technologies that enable urban intelligence also serve as potential entry points for malicious actors, creating a dual-use dilemma.

Each connected device and automated service enlarges the digital attack surface, making cities vulnerable to a wide spectrum of malicious activities (Rejeb, Suhaiza, Rejeb, Seuring, & Treiblmaier, 2022). The consequences of security failures in these cyber-physical environments transcend typical IT incidents. A compromised power grid, a manipulated traffic control system, or a breached public health database can have immediate and severe physical-world consequences, disrupting critical infrastructure, compromising public safety, and eroding the fundamental trust between citizens and their governance (Cavoukian et al., 2009). Therefore, a granular understanding of the threat landscape is not merely a technical exercise but a prerequisite for building resilient and trustworthy smart cities. This paper addresses this need

20 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/the-threat-landscape-of-smart-urban-ecosystems/396811

Related Content

Smart City Buildings for a Resilient, Sustainable Future

Vinod Anand Bijlani (2022). *Urban Sustainability and Energy Management of Cities for Improved Health and Well-Being* (pp. 179-202).

www.irma-international.org/chapter/smart-city-buildings-for-a-resilient-sustainable-future/303529

Searching Through Silos: Assessing the Landscape of Participatory Mapping Research Using Google Scholar and Web of Science

Shelley Barbara Cook, Logan Cochran and Jon Corbett (2020). *International Journal of E-Planning Research* (pp. 23-39).

www.irma-international.org/article/searching-through-silos/261847

A Self-Assessment of Employees' Entrepreneurship Competence: A Cross-Country Analysis

Filomena Pagnozzi, Urve Venesaar, Gilda Antonelli, Petri Nokelainen and Angelo Riviezzo (2023). *The Impact of HEIs on Regional Development: Facts and Practices of Collaborative Work With SMEs* (pp. 17-32).

www.irma-international.org/chapter/a-self-assessment-of-employees-entrepreneurship-competence/325276

Development Trends of PISA 2012 and PISA 2018 Financial Literacy Achievements in Latvia

Linda Mihno (2022). *International Journal of Smart Education and Urban Society* (pp. 1-10).

www.irma-international.org/article/development-trends-of-pisa-2012-and-pisa-2018-financial-literacy-achievements-in-latvia/297064

Exploring Ways to Use 3D Urban Models to Visualize Multi-Scalar Climate Change Data and Mitigation Change Models for e-Planning

John Danahy, Robert Wright, Jacob Mitchell and Rob Feick (2013). *International Journal of E-Planning Research* (pp. 1-17).

www.irma-international.org/article/exploring-ways-to-use-3d-urban-models-to-visualize-multi-scalar-climate-change-data-and-mitigation-change-models-for-e-planning/78888