Chapter 5
Leveraging AI and IoT for Smart Urban Planning and Management: Intelligent Cities

Sitesh Kumar Singh
https://orcid.org/0000-0002-7108-0808
College of Engineering, National University of Science and Technology, Oman

Jaishri Gothania
https://orcid.org/0000-0002-2656-642X
Lingaya's Vidyapeeth, India

Shiferaw Garoma Garoma Wayessa
https://orcid.org/0000-0002-7234-8343
College of Engineering and Technology, Wollega University, Ethiopia

ABSTRACT

This chapter discusses the colliding spaces between artificial intelligence (AI) and the Internet of Things (IoT) to form intelligent cities, i.e., cities that are not only smart but also resilient, adaptive, and human-centered. It offers an imaginary and technological vision of the process of the AI-IoT convergence shaping real-time governance, infrastructure optimization, environmental oversight, and participatory urban planning. The chapter encompasses global case studies and ethical analysis, putting forward the necessity of inclusive, secure, and sustainable digital transformation. We also suggest policy directions and implementation strategies that can promote equitable and sustainable urban ecosystems.

DOI: 10.4018/979-8-3373-3146-1.ch005

INTRODUCTION TOWARD INTELLIGENT CITIES

Context and Relevance

The world is living in a world that is radically changing, as the world in the past has never been involved in the process of massive urbanization as it is today. The United Nations has estimated that the global population will have almost 70 percent urbanization by 2050, which is quite a demographic change with far-reaching implications of implication on the city infrastructure and sustainability (United Nations, 2019). It is not merely a statistical tendency but a multi-dimensional reorganization of human life, economies, politics and human relationships with the world. World economic, technological, and environmental policies are now being formed in the city which are regional capitals of economic and cultural interests. That rapid growth is also imposing massive burdens on the existing systems and mobility networks of the transportation and housing, energy infrastructure and waste management systems not to mention the social infrastructure monoliths all of which were to accommodate orders of magnitudes smaller and more inert populations.

The city planning and city management structures that have been based on the rigid bureaucratic systems and the non-evolving data cannot be useful in addressing dynamically demanding realities of the present-day urbanization. A multi-layered and complex system as it is at the present-day, this requires real-time responsiveness, the development of resilience in the face of climate threats and integration into the provision of services. In response, cities around the world are expanding with hi-tech digital technologies to re-architecture their shapes and domination. Artificial Intelligence (AI) and the Internet of Things (IoT) become the next in the list of these technologies as such a combination result in the formation of the new urban model, the Intelligent City (Ullah et al., 2023).

Intelligent Cities is a better development, and in many respects is far more than Smart Cities is. Intelligent Cities extend beyond digital connectivity, informational-based services and resources management that characterize the Smart Cities; instead, they emphasize cognitive practices. These cities use AI to process large volumes of information sent by the IoT networks and not only can be used for optimization but also to predict and adapt to as well as proactively manage the city (Batty et al., 2012). At that, artificial intelligence is the brain of the city that provides a set of analytical thinking and decision-making abilities to simulate human intelligence. IoT, in its turn, cooperates as the nervous system of the city that constantly perceives and transfers the information about the environment state, the operation of the infrastructures, and the work of the citizens.

The symbiosis between the implications and the IoT is also such that it transforms cities into active problem solvers, as opposed to people who used to be passive data