

# Research on Future Urban Planning and Architectural Design Based on Artificial Intelligence Background

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**Abstract:** With the continuous improvement of the level of information technology, the research of a new generation of artificial intelligence has made breakthrough progress. The application of new-generation technology in urban planning provides new opportunities for the construction and management of future cities but also brings new risks. Next, based on the overview of artificial intelligence technology, it will look forward to the future urban planning changes, as well as the specific performance of artificial intelligence technology in architectural design, to provide references for promoting the development of cities in the expected direction.

**Keywords:** Artificial intelligence; Urban planning; Architectural design; Intelligent cloud platform

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## 1. Introduction

Back in 1956, Stanford computer scientist John McCarthy first proposed the concept of “artificial intelligence” at the Dartmouth conference. Until the recent decade, artificial intelligence has been continuously developed under the joint drive of new theories and technologies such as mobile Internet, big data, cloud computing and deep computing represented by artificial neural networks. Today, artificial intelligence technology is entering all aspects of urban life and production, and has a great impact. Urban development is also updated with the continuous innovation of new data, new technologies and new methods, and the attention of artificial intelligence technology in the field of urban planning is also getting higher and higher. Some scholars predict that in the next five years, AI-assisted urban planning technology will be greatly improved by relying on the birth of a new generation of artificial intelligence technology, and bring great possibilities for the next step of urban planning technology reform, and even bring changes in the entire urban planning thinking and methods. Therefore, based on the development of artificial intelligence technology, this paper will discuss the specific performance of future urban planning and architectural design.

## 2. Intelligent transformation of urban planning and architectural design

### 2.1 Innovative planning methods

In the future city based on artificial intelligence technology, the first prerequisite for realizing the comprehensive perception of the city is to build a digital environment with new infrastructure, such as the Internet of Things and communication networks as the ecological base, providing dynamic and continuous data about urban people and things, and form the decision-making information flow of urban material and social space. Data collection in the urban digital environment consists of two parts: one is the perception of relatively fixed sensors, that is, the perception of physical Spaces such as urban roads, buildings, and urban furniture, and the data is interconnected and transmitted by communication networks. For example, the Xiongan City of the Future is formulating standards and norms for this kind of urban data perception, data opening, and security management, and the prototype of the city’s comprehensive perception that we can see has been preliminarily constructed. The second is mobile crowd sensing. Every urban resident is both a data source and a mobile intelligent sensing. Carrying a smartphone or wearable device with sensors can generate data when living in the city.

### 2.2 Expand Planning Scenarios

Application scenarios are not only the embodiment of artificial intelligence technology practice but also the leading edge of digital

information perception and feedback. In many current cases, the application scenario is built as the first part, even before the edge intelligence brain. On the one hand, since most of the applications of artificial intelligence scenarios are still in the experimental stage at present, the scene tests can be directly carried out by skipping the two logical steps of perception and intellectual brain and can be iteratively updated without being constrained by the overall framework, so that the technical system can be rapidly improved by relying on the application scene tests. For example, the future community construction in Zhejiang focuses on the creation of 9 major scenes, such as education scenes and traffic scenes, guides the application scene pilot through the system scene secondary index system, and completes the iterative upgrade in a few years. On the other hand, the permission to use the data generated by the application scenario needs to be clarified. After the data is stored in the scene, the standard of desensitizing and obtaining the right to use is still not established. For example, in the future intelligent community planning of Google Sidewalk, a large number of sensing devices have been set up for the public space scene, and the application scene system will accelerate the iteration after the establishment of data right standards and lay the foundation for the construction of edge intelligence brain. The testing and development of application scenarios are the fastest in the current stage of artificial intelligence technology.

### **2.3 Building Intelligence Integration**

The collection, storage, analysis, and subsequent learning and training of city perception data will rely on the city brain. Based on the calculation, analysis and assistance of urban brain, urban problems such as efficient allocation of energy resources, fair and reasonable public services, and resilient early warning of urban safety will be improved. The current form of urban smart brain construction is more similar to urban integrated solutions, with Tencent, Alibaba, and other Internet companies with natural advantages for artificial intelligence technology leading the provision of solutions, including the formation of data resource platform, intelligent platform, computing platform and application support platform and other multi-dimensional urban integrated solutions. Taking Tencent Future City as an example, it proposes to build a human-centered “distributed” multi-brain intelligence, multi-station collaboration, and mass service on-demand call technology system, which supports the city to flexibly cooperate, synergize and overall intelligence like a living body. Distributed multi-brain intelligence is a multi-level urban intelligence brain system, including the central and edge brains. The single limbic brain is regarded as a single line of intellectual brain, which senses and responds to marginal information and is also linked to the central cerebral brain. The urban smart brain is the system integration of swarm intelligence, which can significantly assist urban governance and decision-making.

## **3. Intelligent outlook of future urban planning and construction**

### **3.1 Mixed trend of urban functional space**

Based on the comprehensive perception of the city, the continuous dynamic urban functional data will be simulated and counted by the visual functional partition by artificial intelligence, while its realistic external spatial representation has no necessity for functional partition. Especially when functions such as work, entertainment, recreation, and social interaction can be completed in the same spatial scene with the assistance of virtual simulation and other devices, and these activities do not interfere with the activities of others, a single spatial scene will tend to be variable and mixed, becoming a collection of urban functions. From the perspective of typology, it can be predicted that future land use and space types of urban planning will be greatly simplified and can even be divided into functional and restricted spaces. However, the types of scenes that can be created by functional space will show rich diversity. New mixed communities with extensive “linking” of multiple functions (residential, office, commercial, medical, etc.) will become a new type of urban functional space in the future.

### **3.2 New spatial perception of virtual-real fusion**

All kinds of intelligent virtual simulation will become increasingly common, bringing more effective, more intelligent, and more humanized technical assistance to future urban planning and evolving a new perception of space that integrates virtual and real. Taking urban behavior as an example, digitalization and visualization will make people’s visual perception more direct and effective when traveling. At present, people often rely on the mobile phone electronic map for voice navigation when traveling, and they need to look down at the mobile phone map and search for their destination through voice assistance. The visual perception of iconic buildings and other urban images has shifted to the visual perception of voice-hearing and the visual sharing of electronic maps. The emergence of new virtual perception forms, such as holographic digital technology and the combination of digital virtual and landmark buildings, makes the perception of visual perception shift from the perception of the physical world to the new perception of space. This kind of fusion trend will become more and more common in future urban life, and the urban image will become a kind of image-blending of virtual and real. While new technology brings new perceptions, urban planning also requires more comprehensive planning to guide the space.

## 4. Conclusion

To sum up, artificial intelligence technology and the Internet of Things will significantly change the existing living and production modes and carry out subversive reconstruction of the traditional urban spatial pattern, social network form, and urban physical environment space. In the future, the Internet of Everything, artificial intelligence, and VR/AR technology can revolutionize people's lives and production. In order to achieve the comprehensive improvement of people's living standards, the work mode must be automated, and the new development pattern of the economic industry should be promoted.

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