

## REGENERATION UNDER CRISIS—RESEARCH ON THE RENEWAL AND EVOLUTION OF THE FORMS OF FUTURE URBAN RESIDENTIAL COMMUNITIES

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### ABSTRACT

*The rapid development of high-tech technology has brought opportunities to solve the practical problems of poor environment, mixed traffic, and lack of facilities in old urban settlements. This article discusses the future intelligent unmanned autonomous system to participate in the construction of living systems. Through the three-dimensional extension of urban infrastructure and public service systems, the boundary shape of old settlements will be disintegrated and reconstructed. The urbanized form of the city will enhance the living environment of the old community in the city and provide a new idea for the continuous renewal of the urban form of the future.*

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### INTRODUCTION

In recent years, the rapid development of the information age has brought us great convenience, especially the arrival of the 5G era. The high-speed and convenient network space has provided technical support for future unmanned devices such as drones, unmanned vehicles, and robots. Accelerate the construction of future smart communities. However, the existing communities in the city are facing serious environmental problems, chaotic traffic, lack of facilities and unable to meet the living needs of residents, and cannot provide a carrying space for the construction of future smart communities.

In order to discuss how existing communities can adapt to the construction of future smart communities, the typical representative Baimiao community in Xi'an is taken as the research object, from the aspects of the existing community's material space environment and residents' daily life needs, and the "boundary" is proposed. The concept of "reconstruction" is an organic micro-renewal of the existing community, with a view to providing a more comfortable and convenient community space for the residents in the existing community.

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### BACKGROUND

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## STATUS OF RESIDENTIAL ENVIRONMENT IN BAIMIAO COMMUNITY



The Baimiao Community is located in the golden section of Bianjia Village, wrapped in the middle of the South Second Ring Road, Taibai Road, and Youyi West Road. The community was built in 1993, and there are 30 7-story brick-concrete structured plate houses. The nearby villages in the city have been demolished, surrounded by tall buildings (Figure 1), full of traffic, but the area is dilapidated, the facilities are aging, and they are in disrepair. All kinds of temporary buildings such as carports and warehouses have chaotic environments.

**Figure 1. Schematic diagram of community environment**

The original public service facilities in the small area are relatively scarce, and most of them were built spontaneously according to their own needs later. At present, there are only a few small buildings on the west side of the entrance (Xi'an Beilin Panjingan Clinic, Community Hot Spring, Ma Runliang Police Station), a 3-storey kindergarten, and a 3-storey service complex on the east side (Pan Jingan Clinic, snack bar, convenience store), etc. Public service facilities. These facilities are scattered in layout and single in function, which brings great inconvenience to residents' daily use. During the planning of the community, the rapid development of private cars was not predicted, resulting in chaos in the community today, people and vehicles mixed, residents' public activity spaces were occupied, outdoor activity spaces became fragmented, and dangers were everywhere visible. For the only relatively small square in the community, the site is too empty, and it is not equipped with corresponding leisure facilities, shading facilities, etc., which gradually reduces it to an unattractive "lost space".

The facade of the residential building in the community often has a variety of external window extensions, such as encapsulating the north balcony as a kitchen operation space, and adding a shelf that protrudes from the external wall at each external window. Window protection nets, air-conditioning racks, etc., that is, various facilities attached to the external wall that were built spontaneously based on various living purposes when the original building was initially built and after the residents lived, resulting in chaotic facades and hidden security risks. The big problem.

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## STATUS OF PUBLIC LIFE IN BAIMIAO COMMUNITY

Due to the deteriorating environment and incomplete public service facilities in Baimiao Community, a large number of young indigenous people in the community gradually moved out of the community. The rest are mostly left-behind elderly retired from surrounding units. The attachment to the living environment and the inconvenience of economic and physical conditions are unwilling to move away. At the same time, due to the superior geographical location and cheap rent of Baimiao Community, a large number of migrant workers are willing to live here. At present, there are 1648 households in the community, 5288 people, 1850 people are over 60 years old, the aging degree has reached 35%, and have lived in the community for more than 10 years; the number of migrant workers is about 3172, which is the total number 15%. Therefore, the elderly and migrant workers with low economic income in the community become the main residents, and the family structure is mainly composed of two or three persons.

In summary, the poor environment, mixed traffic, and lack of facilities in the Baimiao community have caused the living and living conditions in the community to be far from being able to meet the various behavior needs of residents. The social life network and physical space environment of the entire community urgently need to be optimized, upgraded and updated to improve the quality of life of residents and activate the vitality of the community.

## METHODOLOGY

The article mainly uses the on-site investigation method to investigate the shape, environmental status and infrastructure of the old community in Xi'an, Shaanxi Province. By summarizing and sorting out the problems in the existing old community, it is proposed to build a brand new one by using unmanned equipment. The service system solves the problems of poor environment, lack of infrastructure and chaotic forms of residential areas in old communities.

## FINDINGS

### THREE-DIMENSIONAL EXTENSION OF URBAN INFRASTRUCTURE AND PUBLIC SERVICE SYSTEM BASED ON UNMANNED SYSTEM

The traditional urban infrastructure and public service system is a two-dimensional system, serving each community in a point-and-face manner. Although the layout of various infrastructures satisfies a suitable travel radius in terms of distance, with the rapid development of urban modernization in recent years, the intrusion of cars and other phenomena have led to extremely crowded roads, extended travel time of residents, hindered efficiency, and public service facilities It has not been fully utilized, and public services are inefficient. The urban infrastructure and public service system should be further improved to meet the needs of urban expansion. The rapid development of unmanned devices such as drones, unmanned vehicles, and robots provides an opportunity for the extension of life service networks. First of all, we should sort out the existing community surrounding infrastructure and the status of the public service system, retain the intact parts for repair and maintenance, and continue the original two-dimensional system. Secondly, provide unmanned self-service systems in the community to carry the space, extend the urban infrastructure and service system from two to three dimensions, build a new service network under the three-dimensional system, maximize service efficiency, and make residents' The use of facilities is more convenient.

With the intervention of the unmanned autonomous system in the future, the community will build five major systems of express delivery, residence, medical treatment, travel, and greening to connect with urban infrastructure and public service systems to solve the travel, medical, and environmental difficulties of residents in the community.(Figure 2)Difference, Traffic chaos and other

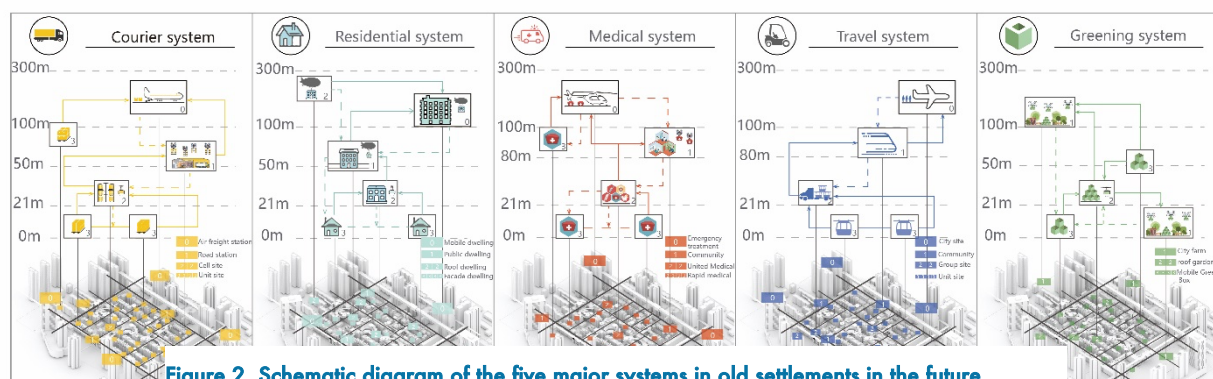


Figure 2. Schematic diagram of the five major systems in old settlements in the future

issues. In order to provide space for the system, restore the internal and external environment of the community, building facades, roofs, etc., and dismantle private buildings under the premise of recording the lifestyle of residents, and establish vertical and horizontal systems in the community, of which the vertical system It is mainly to build grids and tracks on the building facade and roof. The horizontal system is mainly to carry out a balanced layout in the community, implanted in different levels of medical, express, parking, greening, residential and other sites, the humanoid, vehicle, logistics, etc. Connect the system to build a three-dimensional transportation network, connect the community network system with the urban network system, and provide a more convenient service system for residents' daily life.

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#### DISINTEGRATION AND RECONSTRUCTION OF BOUNDARY SPACE BASED ON UNMANNED SYSTEMS

The boundary spaces of traditional existing communities, including the outside environment of the community, building facades, roofs, etc., are mostly in uncontrolled "grey areas" or "lost spaces", which have long been occupied by private and random construction activities by residents and some vendors, resulting in In addition to the waste of space and a lot of hidden safety problems, this phenomenon also reflects that such space has certain use value, and the residents' demand for transformation is strong. Therefore, the reconstruction of the boundary space can better serve the residents in the community. As the intelligent unmanned system breaks the original urban model, the boundaries of the existing community in the city will also collapse (the traditional ground floor will be raised to the height of the roof, the vertical facade of the traditional building, the roof will also become Free docking windows, etc.), the reconstructed boundary space can provide a loading space for unmanned systems, and activate the boundary space with the intervention of unmanned systems to meet the needs of residents.

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#### CUSTOMIZATION, MODULARIZATION AND STAGED CONSTRUCTION BASED ON RESIDENTS' NEEDS

In the traditional existing community, due to the complex composition of personnel, different living objects will inevitably lead to the differentiation of needs due to their own economic conditions, physical conditions, etc., and the needs of different periods are still a dynamic evolution process. The adaptive transformation of existing residential areas should be flexible and time-sensitive. It can be customized and staged for different user groups. Modular design can be used to continuously make certain adjustments according to the new needs of residents. To achieve organic updates within the community.(Figure 3)

Community transformation and construction adopt customized services. A total of 36 boxes of different sizes, different functions are provided as carriers for the connection of unmanned equipment and buildings. Including travel boxes, green boxes, medical boxes and residential boxes, residents can customize the corresponding function boxes according to their own needs. After submitting orders in the cloud, they will be distributed and installed by intelligent robots. interference. Different boxes are fixed according to the nature of use, and some can move along the track. For example, the travel box can transport residents who need to travel directly from the outer window of the house to the station in the community. Send to destination. Residents can join the corresponding sharing community to share their experience and feelings about the product, and increase the interaction between neighbors.



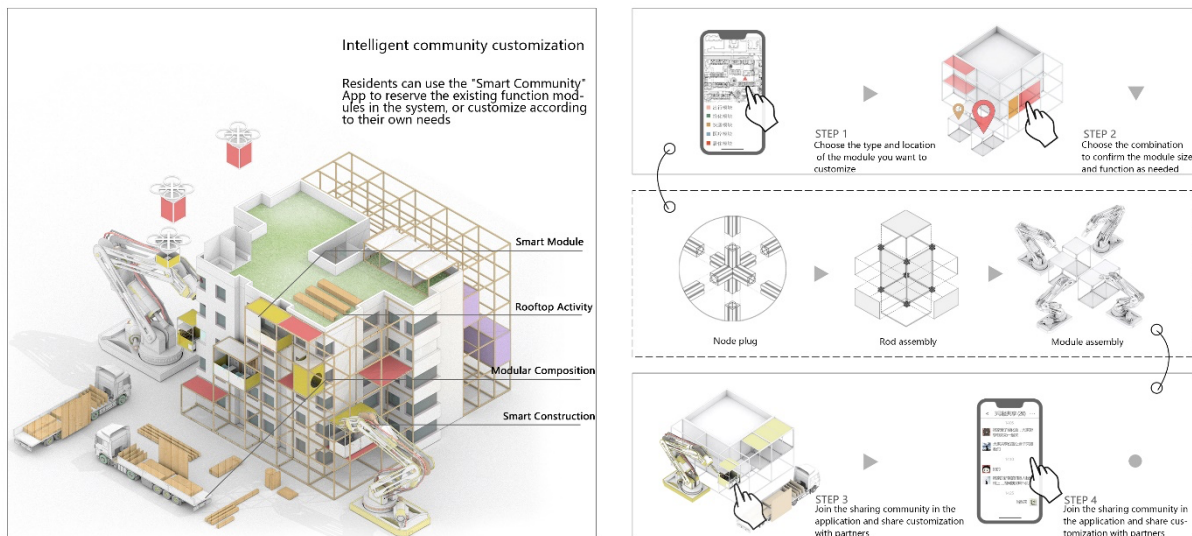


Figure 3. Community customized update flow chart

The Baimiao community and surrounding communities have many similar problems, such as physical space systems and community service networks. Especially for some communities with severe aging, the problems of elderly travel and medical treatment cannot be solved. Therefore, the "boundary reconstruction" design concept and design methods such as construction, shaping and directional customization are a systematic method for updating existing communities from the daily life system of residents to the physical space environment, which is universal and reproducible. The two characteristics are applicable to the Baimiao community and the existing communities in a large number of cities, so as to solve the problems of poor living quality and urgent transformation of the existing communities facing the region. Through the integration and linking of related infrastructure, the unmanned system is integrated into the daily life of residents of the existing community, creating a new life experience, so that the residents of the existing community can also enjoy the dividends brought by technological progress. (Figure 4)

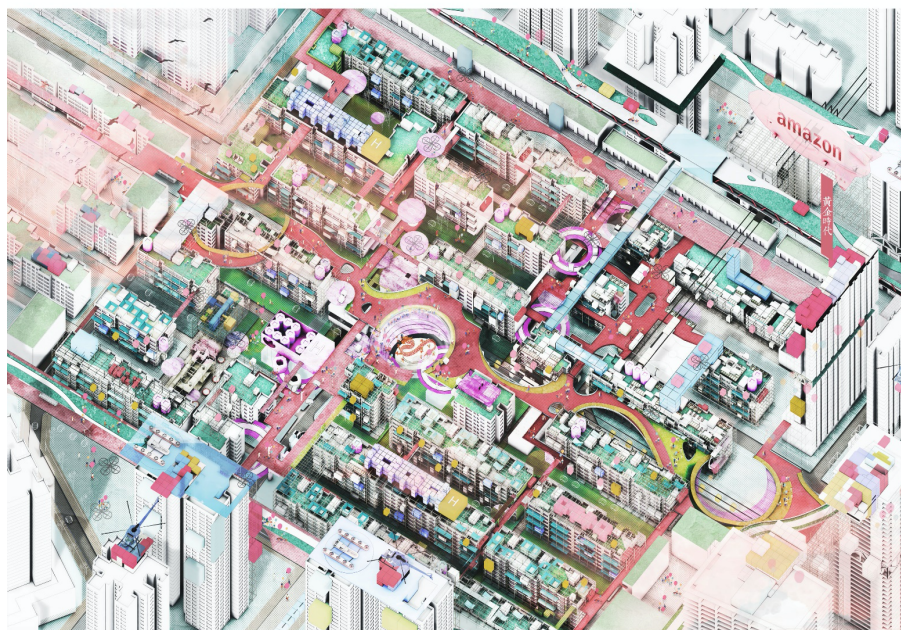


Figure 4. Sketch of the shape of the old settlement in the future

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## CONCLUSIONS

China's real estate industry has gradually entered the "stock era", a large number of existing communities have poor environmental quality and are in urgent need of transformation. The article proposes the concept of "boundary reconstruction", respects the residents' original lifestyle, proposes ways to participate in the construction, shaping, customization, replication, and growth of residential life systems based on future intelligent unmanned autonomous systems, and advocates the extension of urban basic service facilities and The service system may become a new idea for the transformation of existing communities. The development of science and technology can be used to solve many problems in the renovation and upgrading of existing communities, such as the improvement of quality of life, the economics of transformation, and great impact on residents. Sustainability, etc., we will continue to pay attention and follow-up research.

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