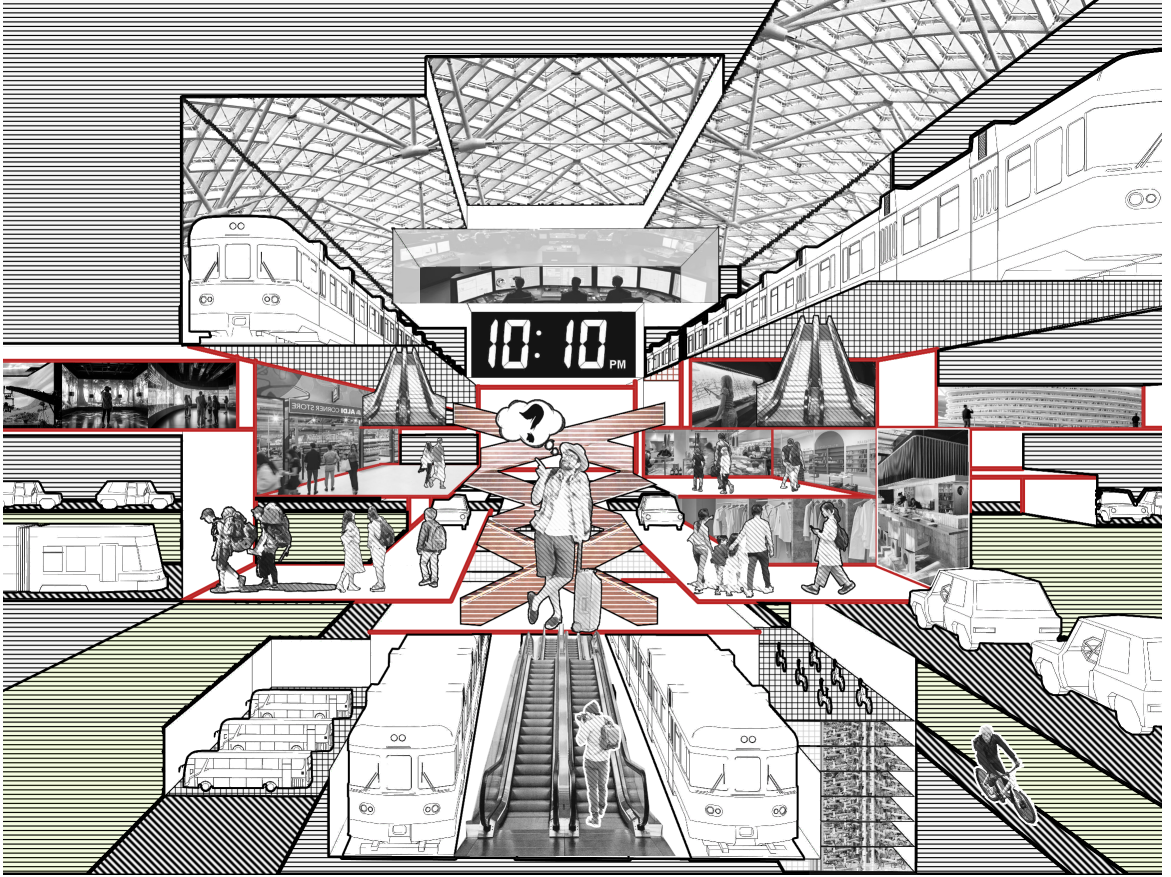


SMART SHARED MOBILITY HUB

Thesis Reflection



Qianchen

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2024/2025 Complex Project Graduation Studio



complex projects



2024

COMPLEX PROJECTS
Bodies and Building Milan
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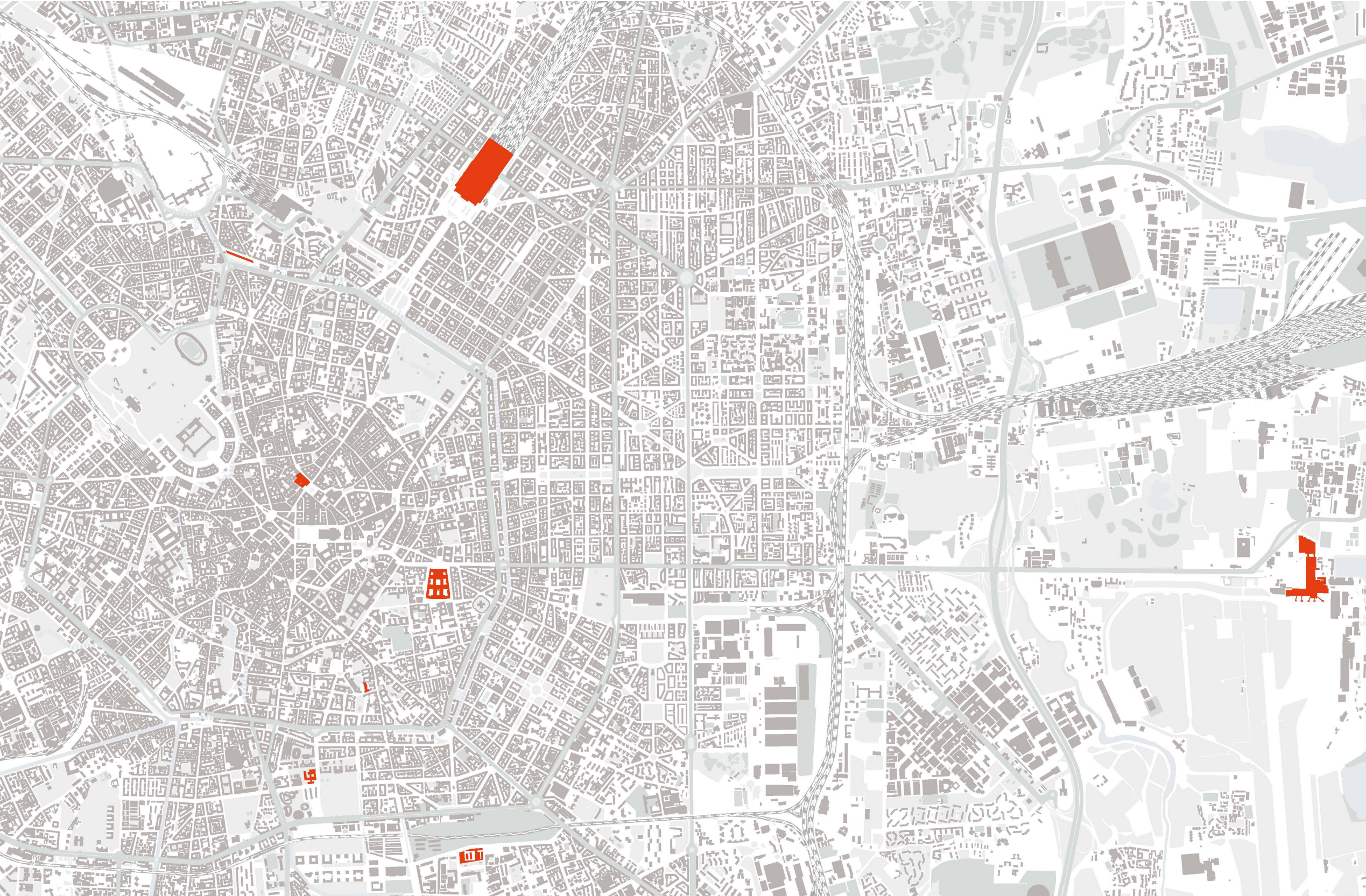
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Bodies and Building Milan
Material



Project Description

Milan is a highly mobile city, with approximately 5.3 million trips occurring in and out of the city each day. However, compared to rail transport, residents tend to favor private modes of transportation, with private car usage reaching 30%—significantly higher than in cities such as Paris, Berlin, and London. One contributing factor to this preference is the aging infrastructure of certain railway stations, which face increasing pressure in accommodating peak-hour passenger flows. Over time, this reliance on private vehicles has given rise to a range of urban challenges, including energy inefficiency and environmental pollution.

In recent years, the municipal government has actively promoted shared mobility and intelligent transport solutions in response to these issues. Since the introduction of tram services in 1893, Milan has continuously expanded its transport network, which now comprises trains, subways, buses, trams, road systems, and micro-mobility modes, forming a diverse and integrated system. As the central hub of this network, Milano Centrale Station has largely retained its original structure since its completion in 1931. In the context of rapidly evolving mobility technologies and shifting travel behaviors, the station now faces an urgent need for strategic upgrades to better support the development of future-oriented, smart and shared transportation systems.

This project therefore seeks to address the following question: How can Milan Central Station evolve into a transportation hub that better supports the development of smart shared mobility in the future? A more fundamental question is: How can architecture ensure the efficient and comfortable coexistence of people and diverse transportation mode.

This project focuses on Milan Central Station, aiming to create a green mobility hub based on the concept of smart shared transportation. As a 50,000-square-meter urban transportation complex, the station integrates various modes of transport, including trains, buses, trams, shared cars, taxis, and shared micromobilities, accommodating a large volume of passengers. In addition to providing commercial facilities, the project will set Milan's transportation control center, which will manage all mobilities and processes. Through an integrated smart system that enables connectivity, the project will contribute to the development of an efficient, intelligent, and sustainable transportation network for Milan, becoming an iconic urban gateway. In this proposal, both people and various modes of transport coexist within the same architectural space. The relationship between the two, along with the optimization of traffic flow, spatial quality, structure, and climate design, requires rethinking and careful consideration.

Aspect 1

The Relationship Between Research And Design

In the two semesters of this studio, I summarized a workflow: first, through research, I identify topics of interest, then based on these topics, I pose design research questions, conduct in-depth research, and finally develop a preliminary design brief to address the research questions. Based on this design brief, the actual design work begins. However, this process is not linear but rather a cyclical one, involving continuous revisions. In my view, research is theory, and design is practice. Successful design outcomes rely on the complementary relationship between both.

Throughout the design process, past research and design proposals serve as guidance, helping me maintain focus and avoid deviating from the initial goals. At the same time, the design process reveals gaps in the research, prompting me to identify flaws in the original design proposal and make necessary corrections. Research provides the framework for design, while design, through practice, drives the continuous refinement of research. Together, they advance the optimization of the final design outcome.

Aspect 2

The Relationship Between Graduation Topic And Studio Topic

The complex studio is dedicated to exploring the relationship between the human body and building. It views building not merely as a static spatial container, but as a responsive spatial system that addresses human needs in terms of scale, movement, comfort, safety, and protection. Within this theoretical framework, I chose to focus on the train station typology under the “Flow” theme—a category inherently complex, as it must accommodate not only the dynamic flow of people, but also the physical presence and operational logic of trains and other transportation modes. These infrastructural systems exert a profound influence on spatial quality, thereby shaping bodily perception and spatial experience.

In the early stages of design, I unconsciously prioritized the operational logic of transportation systems over the human experience. For example, the large-scale structural systems required to support trains often introduced a sense of spatial imbalance and compression, leading to discomfort and a sense of alienation—deviating from the human-centered design ethos.

In response, my graduation project proposes a new vision: the Smart Shared Mobility Hub. This project seeks to investigate how architectural design can mediate the efficient coordination of diverse transportation systems with the creation of a comfortable, human-centered spatial experience. Through integrated strategies involving spatial organization, structural design, and environmental systems, the project aims to strike a balance between transportation efficiency and embodied spatial perception, ultimately creating a future-oriented mobility hub that is both functionally integrated and experientially inclusive.

Aspect 3

Research Method And Approach Chosen By The Student In Relation To The Graduation Studio

Typology serves as one of the core research methodologies in this project. The essence of transportation complexes as an architectural type lies in their ability to act as spatial bridges that connect people with various modes of transportation, while simultaneously ensuring spatial comfort and the efficiency of circulation flows. To explore this, I conducted a typological study of train stations from 1854 to the present, focusing on the evolution of their structural systems, spatial organization, and circulation strategies. The research reveals that, as structural and construction technologies have advanced and urban mobility has intensified, the spatial forms of stations have also evolved. Their functions have gradually expanded from simple waiting halls into multifunctional urban hubs that incorporate hotels, offices, and other auxiliary programs. On the level of circulation, the growing complexity of urban transport systems has transformed train stations from mono-modal connectors between people and trains into integrated intermodal mobility hubs. Accordingly, the challenge of efficiently organizing intersecting flows of movement has emerged as a central design issue.

The control center is another critical component of this project. I examined a number of existing transportation control centers through a typological lens, conducting a comparative analysis of their spatial configurations and functional programs. Additionally, I summarized the spatial requirements of staff members working across various mobility systems. For example, railway control rooms must avoid glare and accommodate the suspension of large electronic display screens, among other operational needs.

Secondly, data analysis plays a vital role in the planning of a mobility hub. The project began by identifying the relevant types of transportation—trains, trams, buses, private vehicles, and micromobility—and determining their respective spatial dimensions. Drawing on data from several major European train stations, I analyzed passenger flow volumes and the required number of motorized and non-motorized parking spaces. This quantitative analysis provided a foundation for estimating the project's capacity and developing a rational spatial plan.

Finally, for the site study, I employed ArcGIS to analyze Milan's population density and the structure of its public transport network. Complementing this with fieldwork, I investigated the architectural fabric and functional distribution around the selected station, focusing especially on pedestrian experiences and walking trajectories. I also documented the circulation patterns of different mobility modes in the station's forecourt area, which informed the spatial strategies in the core design phase.

Aspect 4

Relationship Between The Graduation Project And The Wider Social, Professional And Scientific Relevance

With rapid technological advancement and accelerated urbanization, urban transportation systems are undergoing significant transformation. As a critical node within the metropolitan mobility network, central train stations must exhibit a high degree of adaptability to accommodate the continuous evolution of transportation modes and systems. My graduation project centers on the concept of a "Smart Shared Mobility Hub," aiming to enhance the flexibility and scalability of station architecture through modular and prefabricated design strategies, thereby offering a spatial response mechanism to support the long-term evolution of urban infrastructure.

Moreover, traditional rail systems often occupy large portions of valuable urban land, constraining potential spaces for public activities and green infrastructure. This project explores the possibility of elevating or submerging railway systems to free up ground-level space and activate the underutilized areas beneath elevated structures, promoting more efficient and regenerative use of urban land.

From a broader perspective, mobility hubs can be categorized into three types based on environmental and mobility characteristics: Gateway Hubs, Center Hubs, and Corner Hubs (SHOW Project, 2024). Milan Central Station, as a prototypical Gateway Hub, not only serves as a convergence point for multiple transportation networks but also holds strong symbolic significance within the city. The project envisions it as the core of a future shared mobility ecosystem, where a multi-layered and complementary hub public network fosters efficient intermodal coordination—addressing key professional issues around sustainable mobility while also presenting scientifically valuable hypotheses for the future evolution of urban form and mobility systems.

Aspect 5

Ethical Issues And Dilemmas May Have Encountered During Graduation

The first involved the question of professional boundaries and responsibilities. As an architectural designer, I aimed to create a smart and efficiently functioning transportation hub. However, I quickly realized that many key factors affecting operational efficiency—such as train delays, labor strikes, the scheduling of shared vehicles, facial recognition systems, and station entry time—lie beyond the scope of architectural design. These elements are critical to the user experience but fall into the domains of technology, policy, and operations. This raised an ethical dilemma: how much responsibility should architects assume when addressing systemic efficiency? In response, I focused on what I could control—optimizing spatial planning to reduce walking distances between different mobility modes and designing within the context of existing technologies, such as automated parking systems. This experience led me to reflect on the importance and limits of interdisciplinary collaboration in the design of future infrastructure.

The second one concerned the ownership and governance of public transportation. A mobility hub involves various transportation systems—trains, buses, trams, shared cars, micromobility—which are typically operated by different companies or authorities. For the purposes of this design, I made the idealized assumption that all mobility services would be managed under a unified MaaS (Mobility as a Service) platform operated by the government or a central public agency, allowing users to access all modes seamlessly. However, this assumption introduces an ethical tension: by relying on a simplified and centralized governance model, the design risks overlooking the real-world complexities of fragmented ownership, commercial interests, and policy coordination. This challenged me to consider how far designers can or should go in projecting ideal futures while still acknowledging present limitations.