Intelligent Street: Human-centered Interactive Design for Climate-responsive Urban Environments
Design IV/2026 FALL

Tutor:	Assistant Prof. Chao Yan
Number of participants:	8 students
Studio Time：	SEP. 14 to NOV. 6, 2026, Thursday 8:00-11:35 & Friday 8:00-11:35
Studio Place：	B3
First Meeting:	SEP. 17 2026, Thursday 8:00-11:35, B3

Introduction :

With the increasing frequency of extreme climate events, urban street environments are facing unprecedented challenges. Rising temperatures, heat waves, and changing weather patterns have significantly constrained outdoor activities.

Future streets therefore need to move beyond static spatial configurations toward adaptive and intelligent environments that can perceive human needs, respond to environmental changes, and dynamically support everyday urban life. This studio explores innovative design approaches for next-generation streets by integrating human-factor computation, environmental sensing, and mixed reality technologies.

The course takes human-factor computation and environmental perception as its scientific foundation, guiding students to explore the dynamic relationships among body, climate, and urban space. Through the integration of behavioral data computation, environmental feedback mechanisms, and interactive spatial prototypes, students will develop future street scenarios incorporating movable seating systems, adaptive shading systems, transformable façades, microclimate regulation systems, and responsive street infrastructures.

By establishing an integrated workflow of perception–computation–feedback, the course aims to generate prototypes of next-generation streets that can sense human activities, adapt to extreme climate conditions, and enable continuous interaction between people and their urban environments.

Highlight :

1. Interaction Experiments as a Design Method

Grounded in the principles of cybernetics, the course expands the design perspective from “spatial objects” to “interactive systems.” Students are guided to develop experimental design

methods following the loop of perception–computation–feedback, addressing future street design challenges related to climate adaptation, behavioral response, and spatial experience.

Through interaction experiments, students explore how streets can perceive human activities, understand environmental changes, and establish continuous feedback mechanisms between users and urban environments.

Design explorations include adaptive spatial prototypes such as movable seating systems, adaptive shading devices, transformable façades, and microclimate regulation systems, investigating how intelligent street environments can actively respond to human and climatic conditions.

2. Human-Factor Computation as Scientific Foundation

Drawing upon human-factor science as methodological guidance, the course integrates computational design techniques to analyze human behavioral data, spatial usage patterns, and environmental responses at the bodily scale.

Through the analysis of movement behaviors, staying patterns, spatial perception, and environmental experiences, students develop a data-driven understanding of the relationship between human experience and street performance under extreme climate conditions.

3. Mixed Reality as an Experimental Medium

The course adopts Mixed Reality as a frontier design medium, enabling seamless integration of spatial design data through MR devices.

Students construct full-scale (1:1) virtual street environments within real-world contexts, allowing real-time interaction and empirical validation of climate-responsive and human-centered spatial design outcomes.

Timeline:

Phase 1: Construction of MR Interaction Experiments (2 Weeks)

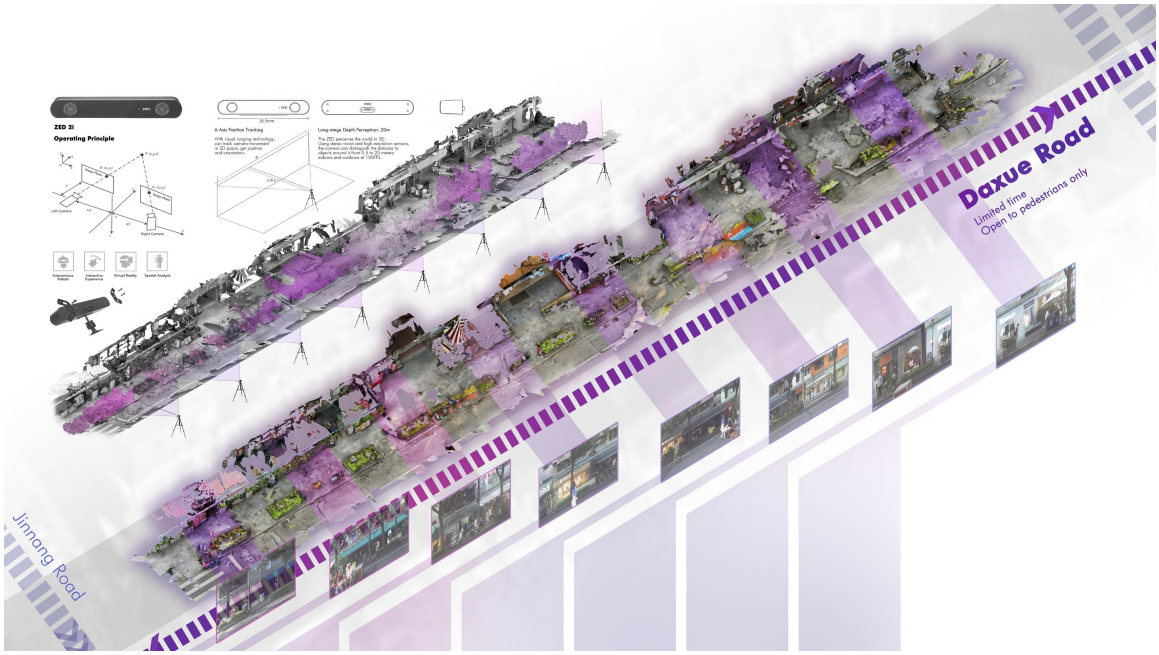
Students will learn to operate the interactive design platform and human-factor analysis tools provided by the course. They will establish a human-centered interaction framework for next-generation street design and conduct behavioral and environmental data collection within selected street contexts.

Phase 2: Human-centered Mixed Reality Street Design (5 Weeks)

Based on the dynamic relationships among human factors, environmental conditions, and spatial elements, students will develop Mixed Reality-based street design experiments focusing on climate adaptation and interactive urban environments.

Phase 3: Experimental Data Collection and Design Validation (2 Weeks)

Students will conduct immersive MR-based evaluations of their proposed street designs. Based on their design concepts and objectives, they will collect and analyze human-factor experimental data to quantitatively evaluate spatial comfort, climate adaptability, and interaction performance.



Submission Requirements:

- Project Presentation File, A3 - 10 pages per student
- Video or 3D animation, 3’00” max