Yuhan Xu

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EDUCATION

Southeast University, China **MEng, Landscape Architecture** 09/2022-06/2025 (Exp.)
GPA: 3.96/4.0 Average score: 90.88/100 Rank: 2/26
Thesis: Incorporating ecosystem services into land use decisions in buffer zones of urban scenic areas

Southeast University, China **BEng, Landscape Architecture** 09/2017-06/2022
GPA: 3.88/4.0 Average score: 89.29/100 Rank: 4/28
Thesis: Examining the factors influencing urban residents' transport-related carbon emissions in the context of dual-carbon goals (Score: 93/100, Outstanding Thesis/Design Award – School of Architecture)

PUBLICATIONS

(* indicates the corresponding author)

Journal Articles

[1] **Xu, Y.**, & Tang, J.***** (2024). Examining the rationality of Giant Panda National Park's zoning designations and management measures for habitat conservation: Insights from interpretable machine learning methods. *Science of The Total Environment*, 170955. [link][code]

[2] **Xu, Y.**, & Ma, X.***** (2024). Assessing urban street vitality through visual and auditory perception: A case study of historic urban area in Guangzhou, China. *The International Review for Spatial Planning and Sustainable Development*, 12(4), 57-76. [link]

[3] Ma, X., **Xu, Y.***, Pan, M., & Jiang, K. (2024). Rethinking public service facility distribution and management strategies with the consideration of carbon peak - Insights from Suzhou, China. *Journal of Cleaner Production*, 143070. [link][code]

[4] Rui, J.*****, **Xu, Y.**, & Li, X. (2024). Destigmatizing urban villages by examining their attractiveness: Quantification evidence from Shenzhen. *Habitat International*, 150, 103120. [link]

[5] Rui, J.*****, & **Xu, Y.** (2024). Beyond built environment: Unveiling the interplay of streetscape perceptions and cycling behavior. *Sustainable Cities and Society*, 109, 105525. [link][code]

[6] Yuan, Y.*****, Gan, Y., **Xu, Y.**, Xie, Q., Shen, Y., & Yin, Y. (2022). SWMM-based assessment of urban mountain stormwater management effects under different LID scenarios. *Water*, 14(1), 78. [link]

Conference Articles

[7] **Xu, Y.**, Ma, X.*****, Pan, M., & Jiang, K. (2022). A two-stage simulation approach of urban transport emission evaluation towards carbon peak: A case study in Suzhou, China. *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, 10, 285-292. [link]

Working Papers

[8] **Xu, Y.**, Chen, C.*****, Deng, W., Dai, L., & Yang, T.***** Spatial eco-socio-economic trade-offs inform differentiated management strategies in mega-urban agglomerations. *npj Urban Sustainability*, Under Review. [code]

[9] **Xu, Y.**, Tang, J.*****, & Zhuang., X. Urban edges, conservation frontiers: Buffer zone planning and management around urban protected areas - Insights from Chinese national-level scenic areas. *Biological Conservation*, Under Review. [code]

RESEARCH EXPERIENCES

Research Assistant, The University of Hong Kong 04/2024-Present

Advisor: Prof. Tianren Yang, Department of Urban Planning and Design

- **Integrating causal inference and surrogate-based modeling to optimize spatial performance** *(Ongoing)*

Funded by the National Key Research and Development Program of China "Theory and methods of planning, construction, and governance based on urban sustainable development" (No. 2022YFC3800302)

  - Identified 4 key spatial performance indicators—vitality, outdoor thermal comfort, air pollution, and economic density—specific to urban functional zones.
  - Leveraged causal graph discovery and causal machine learning to reveal the effects of urban form indicators on spatial performance, now extending this analysis to 36 cities in China.
  - Applying clustering algorithms to classify blocks by urban scale, form, and functional zones, establishing performance benchmarks and identifying top-performing blocks.
  - Developing a surrogate model to propose data-driven optimization strategies, such as adjusting floor area ratios and adding permeable surfaces, within the constraints of real-world urban planning scenarios.

- **Exploring spatial eco-socio-economic trade-offs to inform differentiated management strategies** [8]
  - Developed a framework using production possibility frontiers to evaluate eco-socio-economic efficiency and ecosystem service value improvement potential in mega-urban agglomerations.
  - Employed the InVEST model to map ecosystem service supply and integrated high-resolution location-based data to measure ecosystem service demand in the Guangdong-Hong Kong-Macao Greater Bay Area (GBA).
  - Conducted k-means clustering and fitted production possibility frontiers to assess trade-offs between ecosystem service value and socio-economic well-being across distinct zones within the GBA.
  - Provided tailored recommendations for eco-economic coordination, ecological restoration, and payment for ecosystem services policies, supporting balanced growth and environmental sustainability.

Graduate Researcher, Southeast University 09/2022-Present

Advisor: Prof. Jun Tang, Department of Landscape Architecture

- **Reviewing buffer zone planning documents to identify knowledge gaps and opportunities** [9]
  - Following PRISMA guidelines, systematically reviewed planning documents for 123 urban scenic areas.
  - Employed natural language processing to categorize management strategies in buffer zone plans for 20 representative scenic areas, underscoring recurring themes like ecological protection and visual perception.
  - Identified key knowledge gaps in buffer zone planning and emphasized opportunities for integrating real-time data, advanced AI techniques, and ecosystem service frameworks into future planning efforts.
- **Optimizing national park's zoning and management with interpretable machine learning** [1]
  - Built a species distribution model using the Random Forest algorithm and multi-source geospatial data.
  - Applied interpretable methods, including partial dependence plots (PDPs) and Shapley Additive exPlanations (SHAP), to reveal non-linear correlations between environmental and anthropogenic factors and giant panda habitat (GPH) distribution, highlighting threshold effects of key human-related factors such as national roads.
  - Used GIS overlay analysis to evaluate the effectiveness of zoning designations and management measures within Giant Panda National Park, identifying conflict areas between human settlements and GPHs.

Workshop Participant, DigitalFUTURES2024, Tongji University 06/2024-07/2024

Advisor: Prof. Jiawei Yao, Department of Architecture

- **Predicting the carbon-pollution-heat synergy index using deep learning and multimodal data**
  - Integrated satellite imagery with tabular data to create a comprehensive dataset, applying a generative adversarial network model to predict the carbon-pollution-heat synergy index.

- Conducted GIS overlay analysis to identify priority areas for green infrastructure interventions, with a focus on vulnerable communities to maximize environmental and social impacts.

Collaborative Projects 03/2023-06/2024

Collaborators: Jin Rui, Technical University Dortmund; Xiang Li, The University of Hong Kong

- **Measuring urban villages' attractiveness to support destigmatization** [4]
  - Designed a behavior-space interaction framework to provide quantitative insights for mitigating stigma associated with urban villages, typical informal settlements in China.
  - Analyzed residents' mobility patterns through mobile signaling data, highlighting urban villages' contributions to job-housing balance and diverse service offerings.
  - Investigated non-linear relationships between attractiveness indices and built environment features, revealing key factors that enhance the appeal of urban villages and proposing targeted interventions.
- **Analyzing the interplay between cycling behavior and streetscape perception to guide street innovation** [5]
  - Collected and processed over 1.4M origin-destination (OD) records for bike-share ridership from Shenzhen's Open Data Platform, employing NetworkX to model and map shortest-path cycling routes with precision.
  - Applied k-means clustering for representative sampling of more than 110K street view images and leveraged XGBoost to predict subjective streetscape perceptions, enhancing the accuracy of models.
  - Integrated different regression models to unveil the non-linear spatial interdependencies between streetscape perception, built environment characteristics, and bicycle-sharing volume, revealing key influencing factors.
  - Employed a classification method to analyze the relationship between streetscape perceptual quality and bike-sharing volumes, identifying priority streets for cycling-focused renovations.

Research Assistant, Southeast University 11/2021-12/2023

Advisor: Dr. Xiaosu Ma, Department of Urban Planning

Funded by the National Key Research and Development Program of China "Urban Regeneration Design Theory and Methodology" (No. 2022YFC3800302)

- **Assessing street vitality and quality through pedestrian-level visual and auditory perceptions** [2]
  - Designed a framework to assess street vitality from pedestrians' visual and auditory perceptions utilizing data from 242 sampling points and methods including semantic segmentation and stated preference questionnaires.
  - Identified significant correlations between street vitality and elements such as greenery, infrastructure, and noise, offering actionable insights for enhancing street design and improving the pedestrians' experience.
- **Investigating transport-related carbon emissions (CEs) for informed planning and policy decisions** [3][7]
  - Conducted a two-stage simulation incorporating multi-scenario sensitivity analysis and link-based CE estimation to evaluate uncertainties in achieving transport-related carbon peaking goals.
  - Built an interpretable XGBoost model using PDPs to explore the relationship between built environment characteristics and CE intensity, identifying high-impact factors such as density and facility distribution.
  - Examined individual medical care travel patterns using two OD surveys, uncovering that elevated transportation-related carbon emissions near hospitals are influenced by residents' activity preferences.
  - Discussed trade-offs and synergies between existing planning practices and low-carbon-oriented policy decisions, offering strategic insights to optimize the spatial distribution of public service facilities.

Undergraduate Researcher, Southeast University 01/2020-12/2021

Advisor: Prof. Yangyang Yuan, Department of Landscape Architecture

Funded by the National Key Research and Development Program of China (No. 2019YFD1100405), and the National Natural Science Foundation of China (No. 51838003)

- **Comparing runoff control effects of Low Impact Development (LID) systems** [6]

- Designed two LID systems for managing stormwater runoff in mountainous urban areas.
- Compared the effectiveness of segmental versus terminal LID schemes, using comparative analysis and data visualization to inform optimal scenario selection.

PROJECT-BASED INTERNSHIP

Assistant Planner, Southeast University Urban Planning & Design Institute Co., Ltd. 12/2022-08/2024

- General plan for Mount Tianmu Scenic Area (Chinese national-level scenic area)
  - Developed a GIS database and drafted planning schemes, with a focus on conservation and land use plans.
  - Investigated conflicts between environmental conservation and economic development within urban scenic area boundaries, leading to a first-authored paper on buffer zone planning challenges. [9]

Assistant Designer, Southeast University Architecture Design Institute Co., Ltd. 04/2023-07/2023

- Development planning and urban design for the Mount Tanshi Cultural Park and its surroundings
  - Proposed ecological strategies for wetland conservation by reviewing blue-green infrastructure approaches.
  - Conducted elevation and sightline analysis in ArcGIS to design an optimized viewing system.

Analytical Assistant, Southeast University Urban Planning & Design Institute Co., Ltd. 10/2022-11/2022

- Urban design for the historical urban area of Guangzhou based on heritage conservation
  - Analyzed population distribution, temporal patterns, and work-residence relationships, visualizing spatial demographics in ArcGIS Pro and Kepler.

CONFERENCE PRESENTATIONS

60th World Congress of the International Federation of Landscape Architecture (Istanbul, Türkiye, 2024)
Title: Deciphering anthropogenic influences on habitats: Implications from interpretable machine learning.
Beijing-Hong Kong Conference on Agricultural Microbial Resources (Beijing, China, 2024)
Title: Spatial eco-socio-economic trade-offs inform differentiated management strategies in mega-urban regions.
International Conference on Spatial Planning and Sustainable Development (Kanazawa, Japan, 2023)
Title: Assessing urban street vitality through visual and auditory perception.

SCHOLARSHIPS AND AWARDS

Kang Qi Scholarship and Grant (Top 10%)	2023-2024
Second Prize | Chinese University Data-driven Innovation Competition (CNY 10,000)	2022
Outstanding Undergraduate Student of Southeast University (Top 5%)	2022
Southeast University President Scholarship (Top 5%)	2018-2019

ACADEMIC SERVICE

Journal referees	Humanities and Social Sciences Communications, Computational Urban Science

SKILLS

Languages	Native Mandarin Chinese, Fluent English
Analytical skills	Spatial analysis (ArcGIS Pro, Arcpy, FME), Python (Libraries: Pandas, Numpy, Matplotlib, Geopandas, Scikit-learn, DoubleML, NetworkX)
Design skills	Rhinoceros (basic Grasshopper), SketchUp, AutoCAD, Adobe Suite (Photoshop, Illustrator, Indesign), Lumion, Enscape