Yuyan Huang
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Personal Website: https://github.com/yuyan0h/YuyanHuang_Web

EDUCATION

Tongji University (QS 192, 985 project) , Shanghai, China *2023 – 2026 (Expected)*
M.Eng in Urban Planning GPA:4.14/5.0 (Top 5%)
Chang'an University (211 project), Xi'an, China *2018 – 2023*
B.Eng. in Urban Planning GPA: 3.88/5.0 (Top 3%)

RESEARCH & PROJECTS

#1 AI FOR URBAN SUSTAINABILITY

LLM-Assisted Knowledge Graphs for Urban Carbon Mitigation Governance [1][2][5][6][8][14][15][17]
Master Thesis, Advisor: Chao Liu (Tongji University) *Aug 2024 – Dec 2025*

- Authored comprehensive literature reviews on urban informatics and the applications of LLMs in urban planning contexts.
- Constructed a multi-source heterogeneous dataset integrating China's carbon emission, socio-economic, academic, case analysis, and policy data.
- Enhanced retrieval performance through vector-based RAG pipelines using LLM APIs (achieved 92.5% accuracy).
- Extracted and visualized over 100,000 knowledge triples with top-down ontology design and bottom-up GraphRAG extraction.
- Developed four cooperative AI agents to generate city-level carbon emission reports, integrated into the C-SmartGPT system.

Deep Reinforcement Learning for Urban Public Transit Route Optimization
Leader, Advisor: Zhong-Ren Peng (University of Florida); Dongjie Wang (University of Kansas) *July 2025*

- Implemented deep reinforcement learning models using OD data to optimize bus routes and scheduling in Tampa, Florida.
- Led the front-end development of TAMPUS, an html-based platform integrating LLM APIs to visualize and enhance the usability of transit optimization results.

Spatial-temporal Characteristics and Non-linear Influencing Factors of CO2 Distribution in City Clusters [7][13][16]
Main Researcher, Advisor: Chao Liu (Tongji University) *Sept 2023 – Feb 2024*

- Analyzed annual county-level carbon emissions in the Yangtze River Delta and Guanzhong City Clusters to identify spatial-temporal distribution patterns via spatial autocorrelation.
- Utilizing machine learning model to examine socioeconomic and built environment factors influencing carbon emissions.

#2 URBAN FOOD SUSTAINABILITY TRANSITION

Disparities in access to sustainable dining options across the Tokyo Metropolis [3]
Main Researcher, Co-authors: Liqiao Huang & Yin Long (The University of Tokyo) *Nov 2023 – June 2024*

- Collected and analyzed data from over 100,000 restaurants near Tokyo railway stations to quantify menu-level carbon footprints and food-related emissions.
- Developed the SDOI (Sustainable Dining Options Index) framework integrating five dimensions—environmental impact, nutritional value, affordability, crowd density, and menu variability—to evaluate restaurant sustainability.
- Conducted scenario-based analyses and designed interactive data visualizations to reveal spatial disparities and propose pathways for Tokyo's sustainable dining transition.

Sustainable Dining-out Report Series (1-4) with Long Laboratory, The University of Tokyo[4]
Main Researcher, Advisor: Yin Long (The University of Tokyo) *Dec 2023 – Aug 2025*

- Contributed to four research reports on urban dining sustainability. Led visual communication, illustration, and layout design, ensuring clarity, coherence, and effective dissemination of scientific insights.
- Report 1: Carbon footprint analysis of ingredients and cooking methods.
- Report 2: Sustainability assessment of dining-out environment in Tokyo.
- Report 3: Environmental impact evaluation and carbon quantification of Sichuan and Cantonese cuisines.
- Report 4: Comparative life-cycle analysis of six major Chinese regional cuisines.

#3 URBAN ENVIRONMENT AND HUMAN–LAND INTERACTION

Air Pollution Characteristics and Human Health Risk Assessment of Under-ground Parking Garages[9][10]

Leader, Advisors: Liyuan Zhang & Yue Zhang (Chang'an University) *Jun 2020 – Feb 2022*

- Monitored air pollutants (PM2.5, PM10, TVOC, and Benzene) and human activity patterns across 12 underground parking garages over four seasons.
- Tracked pedestrian movement and behavioral flow lines to assess exposure dynamics within enclosed environments.
- Evaluated human health risks for workers, children, and adults under U.S. EPA risk assessment standards.

Idle Land Use Efficiency in Large Archaeological Site Area[11][12]

Leader, Advisor: Wenliang Chen (Chang'an University) *Sept 2021 – Feb 2022*

- Applied remote sensing image recognition to classify land-use types and identify idle land in large archaeological site zones.
- Conducted field investigations and semi-structured interviews with residents to categorize patterns of abandoned land use and propose reuse strategies.

Climate Change Economics Group, University College London

Research Assistant, Mentor: Dr. Haoran Zhang(University College London) *Mar 2023-May 2023*

- Performed data collection and processing concerning IPCC reports and participated in literature search and analysis.

#4 URBAN DECISION-SUPPORT PROJECTS

C-Smart 2.0: Carbon Comprehensive Visualization Platform

Product manager & UIUX Designer, SuSmart City Lab, Tongji University *Sept 2024-*

- Designed product requirements and natural-language interaction features for a carbon and pollution visualization platform targeting policymakers and the public.
- Integrated multi-scale visualization systems (city, district, and building levels) to enable comprehensive carbon-emission data analysis and comparative evaluation.
- Designed and implemented a user-centered front-end interface, supporting real-time exploration and interpretation of carbon indicators for diverse stakeholder groups.

Building an Index System for Green, Low-Carbon and High-Quality Development in Ningbo, China

Main Researcher, Tongji Urban Planning & Design Institute Co., LTD., Shanghai, China *Sept 2024-Apr 2025*

- Developed a comprehensive Sustainable Development Index system for Ningbo, covering five key dimensions: ecological environment, energy efficiency, economic development, social well-being, and governance.
- Designed and implemented a relational database to store and manage multi-source urban sustainability data.
- Created interactive visualization dashboards to display real-time metrics, enabling stakeholders to monitor and evaluate policy outcomes effectively. This work was founded by World Bank.

Smart City Brain Top-level Architecture Design in cities in Yunnan Province & Xinjiang Autonomous Region

Assistant Planner, Tongji Urban Planning & Design Institute Co., LTD., Shanghai, China *Sept 2023-Apr 2024*

- Surveyed the smart city structure and designed a 'city brain' structure for a city in Xinjiang autonomous region, China.
- Collaborated with 5 designers and consultants on smart city planning texts for a city in Yunnan Province, China.

City Check-up Indicator Design for Nanchang City, Jiangxi Province

Planning Intern, Jiangxi Provincial Research Institute of Human Settlements Environment, Nanchang *July 2022-Sept 2022*

- Summarized official documents and guidance for official evaluation of urban construction.
- Supported defining 10 main evaluation categories and 120 quantified indexes in evaluation by the government.

PUBLICATIONS & CONFERENCES

JOURNAL PAPERS

[1] **Huang, Y.**, et al. (2025). LLM-Empowered Knowledge Graph Construction for Urban Carbon Emission Governance, *(In preparation)*

[2] **Huang, Y.**, Li, H., Lu, Y., Wu, R., Chen, S., & Liu, C. (2025).Evidence-Grounded Multi-Agent Planning Support for Urban Carbon Governance via Retrieval-Augmented Generation. arXiv preprint.

[3] Huang, L., **Huang, Y.**, et al. (2025). Disparities in access to sustainable dining options across the Tokyo Metropolis, *Nature Cities,* https://doi.org/10.1038/s44284-025-00235-9

[4] Niu, N., Huang, L., Chen, F., Shen, T., **Huang, Y.,** et al,(2025) Comprehensive nutritional, environmental, and economic assessment for 3,302 recipes in China, *Scientific Data* (*Under review*)

[5] Liu, C., **Huang, Y.**, et al. (2025). Prospects for Large Models' Applications on Stock Spatial Renewal Planning, *Modern Urban Planning (In Chinese)*

[6] Liu, C., **Huang, Y.**, Liu Z., Wu Z.* (2024). Progress of Urban Informatics in Urban Planning Research, Education, and Practice, *Urban Informatics,* https://doi.org/10.1007/s44212-025-00070-2

[7] Liu, C., Zhang, H., **Huang, Y.** (2024). Temporal and Spatial Dynamic Characteristics, Influencing Factors and Corresponding Planning Strategies of Carbon Emissions by Sectors in the Yangtze River Delta, *Shanghai Urban Planning (In Chinese)*

[8] **Huang, Y.**, Liu, C. (2023). Prospective on Urban Informatics, *International Urban Planning*, DOI: 10.19830/j.upi.2023.678. (*Translator, in Chinese*)

[9] Wang, J. & **Huang, Y.**, et al. (2022). Air Pollution Characteristics and Human Health Risk Assessment of Under-ground Parking Garages in Xi'an, China, *Indoor and Built Environment,* https://doi.org/10.1177/1420326X221131951

[10] Zhang, L., Wang, J., Hu X., Zhou J., Zhao M., Zhang J., Bo Y., **Huang, Y.**, Zhang Y.* (2021). VOCs and PM concentrations in underground parking garages of the commercial center and high-rise residential buildings, *Air Quality, Atmosphere and Health*, https://doi.org/10.1007/s11869-021-01003-z.

CONFERENCE PAPERS

[11] **Huang, Y.** (2025), Optimization of Idle Land Use Efficiency in Large Archaeological Site Areas, *2025 China Urban Planning Annual Conference, Shenyang, China*, DOI: 10.26914/c.cnkihy.2025.046600. *(In Chinese)*

[12] **Huang, Y.** (2023), The Activation of Large Archaeological Site Parks from the Perspective of Spatial Governance, *2023 China Urban Planning Annual Conference, Wuhan, China*, DOI: 10.26914/c.cnkihy.2023.050328. *(In Chinese)*

[13] **Huang, Y.**, Zuo, W., Bai, M. (2023). Optimizing industrial structure in Guanzhong urban agglomeration under "double carbon" goals, *2023 China Urban Planning Annual Conference, Wuhan, China,* DOI: 10.26914/c.cnkihy.2023.061438. *(In Chinese)*

PRESENTATIONS

[14] **Huang, Y**., Liu, C*. (2025). City-Scale Carbon Mitigation Plan Collaborating with LLM Multi-Agents, *ACSP Conference 2025, Minnesota, MN (Oral presentation)*

[15] **Huang, Y**., Wu, R., Chen, S., Liu, C*. (2025). Leveraging Large Language Models for Building Knowledge Graphs on City-Level Carbon Emission and Low-Carbon Policy, *IACP Conference 2025, Xiamen, China (Oral presentation)*

[16] **Huang, Y**., Liu, C*. (2024). Intra-urban Spatiotemporal Patterns of Greenhouse Gas Concentrations and Driving Land-Use Factors Identification, *ACSP Conference 2024, Seattle, WA (Oral presentation)*

[17] Li, G., Xiang, Z., **Huang, Y**., Liu C* (2025). Leveraging Large Language Models and Natural Language Processing to Assess Urban Comprehensive Planning Reforms in China, *IACP Conference 2025, Xiamen, China*

[18] Pan, L., **Huang, Y**., Liu C* (2025). Intra-urban Spatiotemporal Patterns of Greenhouse Gas Concentrations in Shanghai, *AESOP Conference 2025, Istanbul, Turkey*

BOOK CHAPTERS

[19] **Huang, Y.** (2025). Low-Carbon-Oriented Territorial Spatial Planning System (第五部分：低碳导向的国土空间规划体系). In: Zhou, J., & Xiao, Y. (Eds.), Introduction of Low-Carbon Spatial Planning. Beijing: Chemical Industry Press. ISBN 978-7-112-30807-1. (*In Chinese*)

[20] **Huang, Y.** (2025). Chapter 3. In: Zhou, J. (Ed.), Spatial Planning and Spatial Form Design. Shanghai: Tongji University Press. ISBN 978-7-5765-1712-5. (*In Chinese*)

[21] **Huang, Y.** (forthcoming). Chapter 9: Digital Empowerment for Carbon-Neutral Urban Planning (第九章：数字化赋能碳中和城市规划). In: Liu, C., et al. (Eds.), Towards Carbon-Neutral Urban Planning. [To be published]. (*In Chinese*)

REPORTS & WHITE PAPERS

[22] **Huang, Y.** (Co-author). (2025). Blue book on applications of generative artificial intelligence in territorial spatial planning (2025). Guided by the Territorial Spatial Planning Bureau, Ministry of Natural Resources of China; compiled by the Key Laboratory of Spatial AI Planning (MNR), College of Architecture and Urban Planning (Tongji University), the Key

Laboratory of Urban Simulation (MNR), and Wuhan Natural Resources & Planning Information Center.

[23] **Huang, Y.** (Main researcher). (2023–2025). Sustainable dining-out report series (Reports 1–4). Long Laboratory, The University of Tokyo.

SELECTED SCHOLARSHIPS, FELLOWSHIPS & AWARDS

China National Scholarship Award for Master Students *(Top 0.2%, ¥20,000 ≈ USD 2,800)* 2024

China National Scholarship Award for Bachelor Students *(Top 0.2%, Total ¥24,000 ≈ USD 3,400)* 2020, 2021, 2022

Scholarship and Grant in Honor of Modern Chinese Scientists *(Top 0.2%, ¥20,000 ≈ USD 2,800)* 2023

Pacesetter Award: Star of Chang'an University *(Top 0.16%, ¥10,000 ≈ USD 1,400)* 2023

Outstanding Research Award: Star of Chang'an University *(Top 0.16%, ¥3,000 ≈ USD 420)* 2023

National Innovation and Entrepreneurship Training Program for Bachelor Students *(Leader, ¥10,000 ≈ USD 1,400)* 2021

Provincial Innovation and Entrepreneurship Training Program for Bachelor Students *(Leader, ¥5,000 ≈ USD 700)* 2020

WUPENiCity Urban Design Competition, Second Award (1/2) 2022

Mathematical Contest in Modeling, Honorable Award (1/3) 2022

WUPENiCity Sustainable Urban Research Report Competition, Medalist Award (1/5) 2021

SERVICES

Part-time Online Tutor for Chinese Overseas Students, *Remote* *Fall 2024 – Present*

- Provided academic tutoring for undergraduate students at overseas universities, including University of Toronto and Australian institutions, focusing on urban studies and data analysis.

IPAS Conference Support – Long Laboratory, *The University of Tokyo* *Fall 2025*

- Contributed to pre-event coordination and on-site photography for the International Planetary Actions for Sustainability (IPAS) conference.

Teaching Assistant – Sustainable Smart Urbanization, *Tongji University* *Spring 2024*

- Assisted in course delivery, grading, and student guidance for a graduate-level class for over 100 students.

AI for Cities – Conference Support, *Tongji University* *Summer 2024*

- Contributed to contacting, coordination, and on-site service for the conference.

RESEARCH INTERESTS

AI for urban sustainability transition.

SKILLS

Programming, Analysis & Visualization: Python (pandas, PyTorch, NLP, APIs), ArcGIS, MATLAB, LaTeX, Figma, Illustrator

Language: Mandarin, English (TOEFL 103, R28, L28, S23, W24, CET-6 652), Japanese (N1, highest level), Spanish (A1 level)

SOCIETY MEMBERSHIPS

Student Member, Architectural Society of China, 2024-2025

Student Member, Association of Collegiate Schools of Planning (ACSP), 2024–2025

President, Jiangxi Student Association in Shaanxi Province, China, 2022–2023

REFERENCES

Dr. Chao Liu, *Associate Professor*, College of Architecture and Urban Planning, Tongji University

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Dr. Yin Long, *Associate Professor*, Graduate School of Engineering, The University of Tokyo

E-mail: longyin@g.ecc.u-tokyo.ac.jp

Dr. Yue Zhang, *Associate Professor*, School of Architecture, Chang'an University

E-mail: zhangyue-up@chd.edu.cn

Dr. Dongjie Wang, *Assistant Professor*, Department of Electrical Engineering & Computer Science, Kansas University

E-mail: wangdongjie@ku.edu