

## Zhihang Liu

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## Research Interests

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Complex Systems Modeling, Big Geospatial Data, Urban Computing, Sustainable transportation, Computational Social Science

## Work Experience

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**Full -time Research Assistant / The Chinese University of Hong Kong** 2023.9-2024.3

- Institute of Space and Earth Information Science (<http://www.iseis.cuhk.edu.hk/en/>)
- **Participation in Project:** “Vehicle Detection and Vehicle-kilometrage Estimation Based on Remote Sensing Technologies”, Smart Traffic Fund, The Government of Hong Kong SAR, No. PSRI/44/2208/PR, 2023 – 2025. (PI: Prof. Mei-Po Kwan) ([Link](#))
- **Research Direction:** Deep Learning of Remote Sensing and Modeling of Complex Transportation Systems
- **Supervisor:** [Prof. Mei-Po Kwan](#)

**Summer Intern / The JTL Urban Mobility Lab at MIT** 2023.6-2023.9

- **Research Direction:** Mobility AI with urban imagery, networks, and natural language
- **Completed Project:** Holistic urban sensing based on remote sensing and street view images using Vision Transformers (<https://github.com/Liu-Zhihang/MIT-Summer-Research-Interns>)
- **Supervisor:** [Prof. Jinhua Zhao](#)

**Full -time Research Assistant / Technical University of Munich** 2022.9-2023.9

- Department of Aerospace and Geodesy, Professorship for Big Geospatial Data Management (<https://www.bgd.ed.tum.de/en/>)
- **Participation in Project:** “Towards a NAS Benchmark for Classification in Earth Observation”, Sponsored by: [TUM Data Science in Earth Observation](#) cooperating with the [German Aerospace Center \(DLR\)](#), 2022-2023 ([Link](#))
- **Research Direction:** Complexity & Complex Networks, Auto ML
- **Output papers:** *Efficiency and equity of the multimodal travel between public transit and bike-sharing accounting for multiscale, Spatio-temporal Analysis of Urban Economic Resilience during Covid-19 with Multilayer Complex Networks*
- Supervisor: [Prof. Dr. Martin Werner](#)

**Part- time Research Assistant/IGSNRR, Chinese Academy of Sciences** 2020.9- present

- Institute of Geographic Sciences and Natural Resources Research (<http://english.igsnrr.cas.cn/>)
- **Participation in Project:** “Cooperative Observation, Transformation Mechanism and Scenario Simulation of Rural Areal System”, Major Program of the National Natural Science Foundation of China, No. 42293270, 2023 – 2027. (PI: Prof. Liu Yansui) ([Link](#))
- **Research Direction:** Regional complex systems simulation & Multi-Agent Reinforcement Learning
- **Output paper:** *Exploring Patterns of Rural Development through Collective Behavior-Based AI Simulation*
- **Supervisor:** [Prof. Yurui Li](#)

## Education

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**MSc in Urban Planning (Geography)/Peking University** 2021.9-2024.6

- Research Direction: Urban Computing
- Supervisor: Prof. Dr. Jiawen Yang

**BA in Public Administration /Sun Yat-Sen University** 2017.9-2021.7

- Research Direction: Computational Social Science
- Graduation Thesis: How Marketisation Affects Village Development: An Empirical Study Based on Multiple Sets of Village-level Data

**Study Abroad Experiences** 2019

- Guest Researcher, Department of Aerospace and Geodesy, Technical University of Munich;
- UK Study Abroad Programme (Full Scholarship), LSE, Cambridge, Oxford, UoM;
- CSC Excellent Undergraduate International Exchange Program, The University of Seoul;

## Skills

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### Computer

- Data Analysis, Graphics, Modelling and Simulation, Python (TensorFlow, PyTorch), R, JavaScript, HTML, Julia, ArcGIS, NetLogo, GEE

### Research Methods

- Machine Learning (Interpretable ML, Graph ML)
- Deep learning (Multi-Agent Reinforcement Learning, CV, NLP)
- Complex networks (Topology, Dynamics, Multilayer)
- Spatial algorithms
- Web spider & Geospatial web data visualization
- Advanced Statistics

## Academic Experience

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### Publications

- Yao, Y., Lei, S., Guo, Z., Li, Y., Ren, S., **Liu, Z.**, ... & Luo, P. (2023). Fast optimization for large scale logistics in complex urban systems using the hybrid sparrow search algorithm. *International Journal of Geographical Information Science*, 1-29.

### Working Papers

- Efficiency and equity of the multimodal travel between public transit and bike-sharing accounting for multiscale (First & Corresponding Author, accepted by IACP2022, Submit to *Sustainable Cities and Societies*, Revision)
- From positive support to negative reaction: The evolution of China's containment policy and its impact on public sentiment during the COVID-19 pandemic (First Author, accepted by IACP2022, Submit to *Humanities and Social Sciences Communications*, Revision)
- Spatio-temporal analysis of urban economic resilience during COVID-19 with multilayer complex networks (First & Corresponding Author, accepted by The ISPRS Geospatial Week 2023, GeoHB Workshop, Submissions in progress)[[PDF](#)]
- Exploring Patterns of Rural Development through Collective Behavior-Based AI Simulation(On going)

- Holistic urban sensing based on remote sensing and street view images using Vision Transformers (On going)
- How do the spatial mobility and economic model shape shop sign landscape? Based on street view images and deep learning (On going)
- Sensing Cities with large language model (On going)

## **Awards & Scholarship**

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### **Awards**

- Travel Grants by the ISPRS Foundation for GSW'2023, 2-7 September 2023[[Link](#)]
- Global Perspectives - Peking University Graduate Student Scholarly Exchange Fund 2023
- Excellent Paper Award in First National Student Land Survey Competition of China Land Science Society 2021
- Second Prize of the 16th Challenge Cup Guangdong University Student's Extra-curricular Academic Science and Technology Works Competition (Provincial). 2021
- Outstanding Talents Training Program for Law and Political Science(excellence) 2017-2020
- Tsinghua University First Young Computational Social Scientist Award 2020
- National Top 100 in All-China Youth Federation's "Youth in China" Eighth Summer Social Research and Practice Activities for College Students 2020

### **Scholarship**

- Peking University Education Abroad Program Scholarship 2023
- Li Xuerou Foundation Scholarship of Sun Yat-sen University (top1%) 2021
- Professor Xia Shuzhang Scholarship of Sun Yat-sen University (top1%) 2021
- National Encouragement Scholarship (National) 2020
- Sun Yat-sen University Academic Innovation Scholarship (School) 2020
- China scholarship council Excellent Undergraduate International Exchange Scholarship (CSC) 2019
- Sun Yat-sen University UK Overseas Study Scholarship 2019
- National Encouragement Scholarship (National) 2019
- Sun Yat-sen University Academic Scholarship 2019
- Sun Yat-sen University First Class Scholarship 2018