



# Zhu Mao

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## • OBJECTIVE

I am now a Ph.D. Student in the State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing (LIESMARS), Wuhan University and I will graduate in June, 2023. I am looking for a Postdoc position in the Photogrammetry and Computer Vision, 3D City and Landscape Modeling, Scene Understanding in Images and 3D models or the related research areas.

## • EDUCATION

WHU (Wuhan University)

Ph.D. in Photogrammetry and Remote Sensing

Wuhan, China

Sep. 2019 – Present

WHU (Wuhan University)

M.Eng. in Surveying and Mapping Engineering

Wuhan, China

Sep. 2016 – Jun. 2018

NUIST (Nanjing University of Information Science & Technology)

B. Sc. in Geographic Information System

Nanjing, China

Sep. 2012 – Jun. 2016

## • WORK EXPERIENCE

IBM CIO Identity Service

Business Analyst in AccessHub Team

Chengdu, China

Jul. 2018 – Aug. 2019

Access Management, UI Design, Team Working Skills, Technical Supports

Geo-Spatial Information Science (Intern)

Student Editor, Article Editing & Proof, Poster Design, Journal Promotion

Wuhan, China

Mar. 2021 – Present

## • RESEARCH INTERESTS & PROSALS

- Photogrammetry and Computer Vision
- Photogrammetric-based 3D City and Landscape Modeling
- Scene Understanding in UAV Images and Photogrammetric 3D models

I am now working on 3D traffic facility modeling, supported by UAV photogrammetry. The main ideas include three aspects:

1. Building a 3D template database of traffic facilities' sub-components
2. Reconstructing the tree topology of traffic facilities via object decomposition in UAV images
3. Assembly-based 3D modeling

Regarding future research plans, I will focus on my current fields to solve the 3D reconstruction issues, such as the 3D modeling problems of glass facades, urban facilities, water surfaces, etc., in photogrammetric 3D models via various algorithms and data and generate complete and photorealistic virtual 3D scenes via photogrammetry.

## • SKILLS

Languages:

- English
- Chinese (Native)

Programming:

- Python
- Matlab

Frameworks:

- Pytorch
- TensorFlow

Tools:

- Opencv
- SketchUp
- ContextCapture
- Get3D

## • PUBLICATIONS

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### • Journal Articles

- [1] [Mao, Z.](#), Huang, X., Niu, W., Wang, X., Hou, Z., & Zhang, F. (2023). Improved instance segmentation for slender urban road facility extraction using oblique aerial images. *International Journal of Applied Earth Observation and Geoinformation*, (Accepted).
- [2] [Mao, Z.](#), Huang, X., Xiang, H., Gong, Y., Zhang, F., & Tang, J. (2023). Glass façade segmentation and repair for aerial photogrammetric 3D building models with multiple constraints. *International Journal of Applied Earth Observation and Geoinformation*, 118, 103242.
- [3] [Mao, Z.](#), Huang, X., Gong, Y., Xiang, H., & Zhang, F. (2022). A dataset and ensemble model for glass façade segmentation in oblique aerial images. *IEEE Geoscience and Remote Sensing Letters*, 19, 1-5.
- [4] [Mao, Z.](#), Zhang, F., Huang, X., Jia, X., Gong, Y., & Zou, Q. (2021). Deep neural networks for road sign detection and embedded modeling using oblique aerial images. *Remote Sensing*, 13(5), 879.
- [5] Yang, C., Zhang, F., Gao, Y., [Mao, Z.](#), Li, L., & Huang, X. (2021). Moving car recognition and removal for 3D urban modelling using oblique images. *Remote Sensing*, 13(17), 3458.
- [6] Gong, Y., Zhang, F., Jia, X., [Mao, Z.](#), Huang, X., & Li, D. (2021). Instance Segmentation in Very High Resolution Remote Sensing Imagery Based on Hard-to-Segment Instance Learning and Boundary Shape Analysis. *Remote Sensing*, 14(1), 23.

## • RESEARCH EXPERIENCE

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- [1] Slender Urban Road Facility (SURF) Detection and 3D Modeling (2019.9-2020.12)
- we propose an improved instance segmentation method to extract slender urban road facilities from UAV images.
  - a dense anchor ratio with an IoU-balanced sampling strategy (DASS) for proposal generation.
  - the balanced finegrained features (BFGF) to improve the boundary segmentation results.
  - work accepted by the journal *JAG* (2023).
  - SURF 3D modeling via template matching.
  - generate 3D points of SURF by triangulation and predict the location and orientation via least-squares fitting.
  - retrieve SURF 3D template from sketch model and texture database.
  - work accepted by the journal *RS* (2021) .
- [2] Glass façades segmentaion and 3D building model repair (2021.5-2022.5)
- we propose an ensemble method to segment glass façades in oblique aerial images.
  - a strategy is adopted to preserve the spatial relationship between glass façade panels.
  - edge features are extracted to improve the detector's performance.
  - work accepted by the journal *GRSL* (2022).
  - glass façades extraction and repair in photogrammetric 3D models.
  - a projection-based method to extract glass façades in photogrammetric 3D building models.
  - a mesh denoising method to remedy the geometric deformation and apply texture mapping to correct the distortion.
  - applying multiple constraints guarantees the proposed pipeline will not worsen the 3D buidling models.
  - work accepted by the journal *JAG* (2023).
- [3] Other research programs
- Vehicle detection in UAV images and moving vehicle removal from photogrammetric 3D urban models (2021.1-2021.4)
  - Fragments assembly methods to virtually restore the Buddha statue in Yungang Grottoes (2022.4-2022.8)
  - Assembly-based 3D traffic facility modeling (2022.9-now, ongoing)

## • HONORS AND AWARDS

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- The Best Volunteer in the 2020 International Graduate Workshop on GeoInformatics (IGWG)
- The Outstanding Student Editor of Geo-spatial Information Science (GSIS)
- Student scholarships of Wuhan University

## • REFEREES

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Prof. Deren Li , Wuhan University

Prof. Xianfeng Huang , Wuhan University (Ph.D. Supervisor)