Zhaoyi Wang

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SUMMARY

Doctoral graduate specialising in photogrammetry- and LiDAR-based 3D data analysis, with a strong focus on cross-modal fusion of point clouds and images, multi-temporal 3D change detection, and environmental monitoring. Experienced in developing scalable, GPU-accelerated pipelines for analysing terrain and surface dynamics, with an emphasis on methodological generality and applicability across different sensors and natural environments.

EDUCATION

ETH Zurich **Zurich, Switzerland**
PhD in Geomatics, Institute of Geodesy and Photogrammetry Oct. 2021 - Nov. 2025
- Thesis: "Cross-modal fusion of point clouds and RGB images for landslide monitoring"

University of Science and Technology of China **Hefei, China**
MSc in Precision Engineering Geodesy Sep. 2018 - Jun. 2021

Changsha University of Science and Technology **Changsha, China**
BSc in Surveying and Mapping Engineering Sep. 2014 - Jun. 2018

SELECTED PUBLICATIONS AND SUBMISSIONS

Wang, Z.Y., Trybala, P., Wieser, A., & Remondino, F. (2026). MultiChange3D: A multi-scene, multi-sensor dataset for benchmarking 3D geometric change detection. ISPRS Congress 2026. (Accepted)

Wang, Z.Y., Butt, J.A., Huang, S.Y., Medić, T., & Wieser, A. (2026). Dense 3D displacement estimation for landslide monitoring via fusion of TLS point clouds and embedded RGB images. *International Journal of Applied Earth Observation and Geoinformation*.

Wang, Z.Y., Butt, J.A., Huang, S.Y., Meyer, N., Medić, T., & Wieser, A. (2025). An approach for RGB-guided dense 3D displacement estimation in TLS-based geomonitoring. *ISPRS Annals, ISPRS Geospatial Week 2025*. (Oral presentation)

Wang, Z.Y., Huang, S.Y., Butt, J.A., Cai, Y.Z., Varga, M., & Wieser, A. (2025). Cross-modal feature fusion for robust point cloud registration with ambiguous geometry. *ISPRS Journal of Photogrammetry and Remote Sensing.*

Wang, Z.Y., Varga, M., Medić, T., & Wieser, A. (2023). Assessing the alignment between geometry and colors in TLS colored point clouds. *ISPRS Annals, ISPRS Geospatial Week 2023*. (Oral presentation)

PROFESSIONAL SKILLS

- **Core Research Areas**:
  - Photogrammetry and LiDAR-based 3D data analysis, cross-modal fusion of point clouds and images
  - Multi-temporal 3D change detection, environmental and terrain dynamics
- **Remote Sensing & Spatial Data Analysis**:
  - LiDAR (MLS/TLS/ULS/ALS), Photogrammetry (SfM/MVS), multi-temporal change detection
  - Large-scale spatial analysis, integration of spectral and 3D structural information
- **Programming & HPC**:
  - Python, C++, MATLAB, Linux, shell scripting; high-performance computing on cluster environments
  - Parallel processing and large-scale data handling; GPU acceleration with PyTorch and CUDA
- **Key Libraries & Tools**:
  - scikit-learn, Scipy, Pandas, laspy, PyTorch, Open3D, OpenCV, COLMAP
- **Software**:
  - Agisoft Metashape, CloudCompare, Leica Cyclone, RIEGL RiSCAN, FARO SCENE
- **Languages**: English (Professional), Mandarin (Native)

RESEARCH EXPERIENCE

Geosensors and Engineering Geodesy, ETH Zurich **Zurich, Switzerland**
Doctoral Student Oct. 2021 - Nov. 2025
Supervisor: Prof. Dr. Andreas Wieser
- Developed AI-enabled geospatial pipelines for environmental monitoring by integrating TLS point clouds with image-based representations, including deep learning-based detectors (Faster R-CNN, YOLO-X, YOLO-v7)

- Proposed cross-modal feature fusion methods and developed end-to-end geospatial pipelines for robust point cloud registration and multi-epoch 3D displacement estimation in complex natural environments, supporting the quantification of surface-related dynamics over time
- Conducted collaborative research with the Geodesy group at TU Munich (TUM) and the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) on landslide monitoring and deformation analysis using observations from different sensors
- Implemented GPU-accelerated algorithms (PyTorch + CUDA) for large-scale environmental 3D data processing, enabling scalable analysis across spatial scales and repeated observation epochs
- Designed automated preprocessing and quality-control workflows for multi-epoch UAV RGB data, including depth map consistency, visibility tracking, and change evaluation over natural terrain

3DOM, Fondazione Bruno Kessler (FBK) **Trento, Italy**
Visiting Researcher Sep. 2025 - Nov. 2025
Collaborator: Prof. Dr. Fabio Remondino

- Developed and benchmarked multi-scene, multi-sensor 3D change detection methods, focusing on generalization across diverse spatial scales, point densities, and environmental conditions (e.g., terrain complexity, vegetation growth)
- Contributed to automated pipelines for multi-epoch UAV RGB reconstruction and 3D surface change analysis, with methods readily transferable to terrain and vegetation dynamics in natural environments

PROFESSIONAL EXPERIENCE

Geosensors and Engineering Geodesy, ETH Zurich **Zurich, Switzerland**
Research and Teaching Assistant Oct. 2021 - Dec. 2025

- Contributed to data processing and analysis for multi-epoch monitoring projects, including the MAST structural monitoring project and the Tor Alva (The White Tower) monitoring project, focusing on the interpretation of high-accuracy deformation measurements in close-range environments
- Participated in field measurement campaigns for the natural hazard monitoring (e.g., the Mattertal landslide), supporting on-site data acquisition, sensor deployment, and subsequent data processing in complex terrain
- Assisted in student lab exercises for Master-level courses in Geomonitoring and Geosensors, and Geospatial Data Acquisition

Dilusense Co., Ltd. **Hefei, China**
Computer Vision Algorithm Intern Mar. 2021 - Jun. 2021

- Developed algorithms for RGB-D camera calibration and depth estimation, strengthening expertise in image-based 3D reconstruction and sensor integration.

NSRL Volunteer Groups, University of Science and Technology of China **Hefei, China**
Volunteer Interpreter Sep. 2018 - Jun. 2021

- Supported interpretation and communication activities for visiting scholars and guests

International GeoInformatics Summer School (IGSS), Wuhan University **Online**
Summer School Student Aug. 2020 - Aug. 2020

- Completed online coursework in Machine Learning and Pattern Recognition, gave by Prof. Marcello Pelillo
- Delivered a team presentation on “Remote sensing satellite image change detection based on machine learning”

The Hong Kong Polytechnic University **Hong Kong, China**
Summer Exchange Student Jul. 2017 - Jul. 2017

- Visited the Department of Land Surveying and Geo-Informatics (LSGI) and engaged in academic exchange with faculty and students
- Delivered a presentation on “Non-metric digital camera calibration and multi-baseline bundle adjustment for slope deformation monitoring”

SELECTED AWARDS, ACADEMIC SERVICE AND ACTIVITIES

- Best Presentation Award, ISPRS Geospatial Week – Laser Scanning Worknshop Sep. 2023
- First Prize Scholarship (Top 20%, 3×) Sep. 2018 - Sep. 2020
- National Scholarship (Top 2%) Sep. 2020
- Excellent Undergraduate Thesis (Top 2%) Jun. 2018
- Top Grade Scholarship, (Top 1%, 4×) Oct. 2015 - Mar. 2018
- Third Prize, National "ESRI Cup" GIS Software Development Competition Nov. 2017
- First Prize, Surveying and Mapping Skills Contest Jun. 2017
- Peer Reviewer for *ISPRS Journal of Photogrammetry and Remote Sensing, International Journal of Applied Earth Observation and Geoinformation, Measurement, Computational Urban Science, and The European Journal on Artificial Intelligence*
- Personal Interests: Long-distance running (half-marathon), skiing, hiking, table tennis

REFEREES

Prof. Dr. Andreas Wieser
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Chair of Geosensors and Engineering Geodesy (GSEG)
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Prof. Dr. Fabio Remondino
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Leader of 3D Optical Metrology (3DOM) research unit
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