Zhanpei Fang

Email: fangzha@oregonstate.edu
https://orcid.org/0009-0007-5063-0210, https://zhanpeifang.com

Education

Oregon State University, *PhD Candidate, Artificial Intelligence & Geography.* 9/2022 – 6/2027 (anticipated)
Co-advisors: Jamon Van Den Hoek (Conflict Ecology), Fuxin Li (Deep Machine Vision).
Stanford University, *MS Applied & Engineering Physics.* 4/2019 – 6/2020
Stanford University, *BS Physics* (Astrophysics concentration), *BA Art Practice.* 9/2015 – 6/2019

Experience

- **Oregon State University** (Conflict Ecology & Deep Machine Vision labs), *Graduate Assistant.* 9/2022 –
  - **Smallholder plot delineation:** Developing transformer methods for panoptic segmentation of agricultural fields in multispectral VHR satellite imagery (Maxar, Planet) for NASA-funded LCLUC research in East Africa. Adapted Detectron2 for multi-spectral/multi-temporal analysis, developed methods to address cloud contamination and data gaps. Conducted fieldwork in western Uganda. Paper in preparation.
- **Muon Space**, *Data Science Intern*, Mountain View, CA. 6/2026 – 9/2026
  - **Global wildfire monitoring:** Developing foundational data calibration and image processing routines for new multispectral infrared satellite constellation (FireSat) with the Earth Fire Alliance.
- **Orbital Sidekick**, *Junior Machine Learning Scientist (full-time)*, San Francisco, CA. 1/2022 – 9/2022
  - **Methane plume detection:** Developed automated detection pipeline for methane plumes in airborne and spaceborne hyperspectral imagery using matched filtering, anomaly detection, and radiative transfer modeling; implemented PCA and covariance-based methods for noise filtering and dimensionality reduction.
  - **Tree speciation:** Designed and led ground truth collection campaign for tree species classification from hyperspectral signatures; organized terrestrial spectrometry of tree foliage & participated in aerial data acquisition flights; developed classification models for wildfire risk assessment & above-ground carbon estimation.
- **Descartes Labs**, *Applied Science Intern*, Santa Fe, NM. 6/2019 – 8/2019
  - **Tree canopy mapping:** Used random-forest regression, trained on Sentinel-2 multispectral imagery, to predict changes in percent tree canopy cover at 20m resolution across the entire continental US. Engineered features from vegetation indices and DEM; processed petabyte-scale satellite archives.
- **Kavli Institute for Particle Astrophysics & Cosmology**, *Research Assistant*, Stanford, CA. 4/2018 – 3/2020
- **Caltech LIGO Laboratory**, *SURF Fellow*, Pasadena, CA. 6/2017 – 8/2017
- **Carnegie Institution Dept of Global Ecology**, *Research Assistant*, Stanford, CA. 7/2016 – 10/2016
  - **Sea-ice climate hazards**: Analyzed passive-microwave satellite data to quantify sea-ice-cover impacts on coastal vulnerability of an indigenous Alaskan village, first-author publication in *Arctic Science* [4].

Current projects

- **Uganda refugee smallholder agriculture:** NASA grant #80NSSC23K0528, "Multi-sensor Mapping of Refugee Agricultural LCLUC Hotspots in Uganda" (2023-26, PI: Jamon Van Den Hoek).
- **Fields of the World:** Contributor to project for plot-level segmentation of global agricultural fields [1], led by Taylor Geospatial and supported by Microsoft AI for Good Lab. Lead author on CVPR 2026 paper [2].
- **Debris mapping:** Currently funded on NASA grant for ML hurricane debris detection in VHR & aerial imagery.
- **Conflict damage mapping:** Member of the Decentralized Damage Mapping Group (DDMG), documenting armed conflict's effects on people and the environment using Earth observations. Recipient of 2025 European Space Agency (ESA) Earth Observation Excellence team award. https://conflict-damage.org/

Conferences & Workshops

- "Overcoming limits to smallholder field delineation in Uganda's refugee settlements", **AGU**, 7 Dec 2026. (oral)
- "PRUE: A Practical Recipe for Field Boundary Segmentation at Scale", Conference on Computer Vision and Pattern Recognition (**CVPR**), 3-7 June 2026. (poster, main track; also as poster at CV4Science Workshop)
- "Global Field Boundary Delineation Model Zoo and Tooling," *Next-Gen GeoAI: Scalable and Research-Driven Machine Learning Applications for Environmental Impact*, American Geophysical Union (**AGU**), 17 Dec 2025. (oral)
- "Deep-learning transformers for panoptic delineation and monitoring of smallholder agricultural fields across Uganda's refugee settlements," *GC43R: Satellite Solutions: Agricultural Monitoring Through Remote Sensing*, **AGU**, 18 Dec 2025. (poster)
- "Transformer methods for universal segmentation of agricultural fields in high-resolution satellite images," *Computer Vision for Science (CV4Science) Workshop*, **CVPR**, 11-15 Jun 2025. (poster)
- "'The purpose of a system is what it does, and science is a thing which people do': from AI epistemology to AI military ethics," *Harms and Risks of AI in the Military*, **Mila - Quebec AI Institute**, 2-3 Dec 2024. (poster)

- "Conflict at the Edge of Visibility," *Unfiguring* conference, Mahindra Humanities Center at **Harvard University**, 23 Mar 2024; *Architects for Gaza* workshop, **American University of Cairo**, 15 Feb 2024. (invited oral)

Publications

1. C. Robinson, G. Muhawenayo, S. Khanal, **Z. Fang**, I. Corley, A.M. Tárano, L. Estes, J. Marcus, N. Jacobs, H. Kerner, I. Becker-Reshef, J.M. Lavista Ferres, "The first global agricultural field boundary map at 10 m resolution", preprint. https://www.microsoft.com/en-us/research/wp-content/uploads/2026/04/FTW_Global_Map_v1.1.pdf

2. G. Muhawenayo*, C. Robinson*, S. Khanal*, **Z. Fang***, I. Corley, A. Wollam, T. Gao, L. Strnad, R. Avery, L. Estes, A.M. Tárano, N. Jacobs, H. Kerner, "PRUE: A Practical Recipe for Field Boundary Segmentation at Scale", *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition* (***CVPR***), 2026. https://arxiv.org/abs/2603.27101

3. S. Adhikari, M. Fishbach, D.E. Holz, R.H. Wechsler, and **Z. Fang**, "The binary-host connection: Astrophysics of gravitational wave binaries from their host galaxy properties," *The Astrophysical Journal*, 2020, vol. 905, no. 1, doi:10.3847/1538-4357/abbfb7.

4. **Z. Fang**, P.T. Freeman, C.B. Field, and K.J. Mach, "Reduced sea ice protection period increases storm exposure in Kivalina, Alaska," *Arctic Science*, vol. 4, no. 4, pp. 525–537, 2018, doi:10.1139/as-2017-0024.

Skills

- **Machine learning & computer vision:** PyTorch / TorchVision, scikit-learn, OpenCV, Detectron2; segmentation, object detection, and other DL architectures adapted for multispectral/multi-temporal imagery. Graduate coursework in advanced computer vision, convex optimization, topological data analysis, and differential information geometry.
- **Geospatial & remote sensing:** GEE, GDAL, GeoPandas, `rasterio`, `xarray`, QGIS, `ipyleaflet`; experience across multispectral (segmentation, classification, regression), hyperspectral (target/anomaly detection, matched filtering, PCA/covariance-based noise/dimensionality reduction, endmember extraction, sparse unmixing) & passive microwave modalities. Radiative transfer modeling (ISOFIT, Py6S), sensor calibration & atmospheric correction pipelines.
- **Data analysis:** NumPy, Pandas, SciPy for scientific image & signal processing; collecting, cleaning, & analyzing messy real-world sensor data. Data viz with Matplotlib, Seaborn, TensorBoard, interactive geospatial tools.
- **Programming:** Python, Git, Linux/Unix, shell scripting, HPC computing (slurm), Jupyter notebooks, LaTeX.

Honors

- PRAx Art + Science Fellowship — 2026
- Jackson's Art Prize, Longlist — 2026
- Dr. Mary L. Brugo Graduate Geography Scholarship — 2025
- Gordon Matzke Scholarship — 2024
- Warren W. Denner Memorial Graduate Fellowship — 2024
- Evans Family Graduate Fellowship in Humanitarian Engineering — 2023 – 2024
- Arthur Parenzin Memorial Graduate Research Fellowship ($2,400) — 2023, 2025, 2026
- Oregon State University Provost's Distinguished Graduate Fellowship ($36,400) — 2022 – 2023
- Gage Academy of Art BIPOC Scholarship — 2020
- Barbara & Sandy Dornbusch Award in Painting — 2019
- Caltech LIGO Summer Undergraduate Research Fellowship (SURF) — 2017
- Stanford Earth Summer Undergraduate Research (SESUR) Program Grant — 2016
- Edmund Maxwell Foundation Scholarship — 2015 – 2019

Teaching & service

- Graduate Teaching Assistant for the following courses at Oregon State University:
  - GEOG 481/581, Satellite Image Analysis. — 1–3/2024, 2026
  - GEOG e580, Remote Sensing I: Principles & Applications. — 1–3/2025
  - GEOG 464/564, Geospatial Perspectives on Intelligence, Security & Ethics. — 4–6/2024, 2025
  - GEOG 451/551, Planning Principles & Practices for Resilient Communities. — 9–12/2024
- Organizer, Geography department spring seminar on "Conflict and Cooperation in the 'Middle East'." — 3 – 6/2025
- Mentor, CEOAS GUIDE, College of Earth, Ocean and Atmospheric Sciences, Oregon State University. — 1 – 4/2023
- Teaching Assistant, Summer Science Program. — 6 – 7/2020, 6 – 7/2021

Professional activities

- Program Committee for AAAI-AISI (AI for Social Impact Track). — 2025 – 2026