Amir Hassanzadeh

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Education

Ph.D. in Imaging Science May 2022
Rochester Institute of Technology *Rochester, NY*

B.Sc. in Engineering July 2016
University of Guilan *Guilan, Iran*

Skills

Programming & Scientific Computing: Python, Java, MATLAB, SQL, NumPy, SciPy, Pandas, Matplotlib
Machine Learning & Computer Vision: PyTorch, TensorFlow, Keras, Scikit-learn, XGBoost, Hugging Face, Weights & Biases, OpenCV
Geospatial & Remote Sensing: Google Earth Engine, STAC, GDAL, Rasterio, GeoPandas, Shapely, Xarray, PyProj, Fiona, Dask, DGGRID, QGIS, ENVI
Earth Observation Sensors: Landsat, Sentinel, MODIS, EO-1 Hyperion, ASTER
Simulation, Point Clouds & Photogrammetry: DIRSIG, MODTRAN, CloudCompare, LAStools, Pix4D, Agisoft
Data & Computing: NetCDF, COG, GeoParquet, Zarr, HDF5, Git/GitHub, Docker, Conda, CUDA, Linux/Bash, LaTeX

Experience

Research Associate Professor April 2026 – Present
Rochester Institute of Technology *Rochester, NY*

- Designed and instructed the course *Applications of Machine Learning in Remote Sensing*, covering Google Earth Engine, supervised/unsupervised ML, and deep learning with PyTorch.
- Advise graduate and undergraduate researchers on self-supervised geospatial foundation models (GeoAI), radiative transfer simulation (DIRSIG, MODTRAN), and sensor trade studies.

Researcher / Engineer II June 2022 – April 2026
Rochester Institute of Technology *Rochester, NY*

- Led the development of advanced thermal algorithms for Landsat 8 and 9 TIRS systems in support of USGS and NASA cal/val teams.
- Engineered a machine learning algorithm leveraging MODIS data and XGBoost for accurate atmospheric water vapor estimation, optimizing the operational Split-Window algorithm.

Machine Learning Intern July 2021 – October 2021
AgerPoint *Remote*

- Developed 5 modular Python packages for high-accuracy crop damage assessment from drone data.
- Built end-to-end PyTorch and Keras pipelines for object detection (Mask R-CNN) and UAS image classification (ResNet).
- Integrated geospatial libraries (GDAL, Rasterio, GeoPandas) with computer vision toolkits (OpenCV, Scikit-Image) for client-facing software deliverables.

Remote Sensing Intern June 2020 – September 2020
PrecisionHawk *Raleigh, NC*

- Architected a PointCNN-based LiDAR point cloud segmentation model in TensorFlow for large-scale drone data, integrating C-based extensions to accelerate Python processing.
- Engineered a PyTorch semantic segmentation pipeline for utility asset inventory with $> 90\%$ accuracy, automating 70–80% of manual inspection workflows.

Graduate Research Assistant August 2017 – May 2022
Rochester Institute of Technology *Rochester, NY*

- Developed deep memory network architectures in PyTorch for hyperspectral image denoising.
- Managed UAV and ground-truth data collection campaigns for broad-acre crop yield and harvest modeling.
- Designed and executed multi-month greenhouse yield experiments, including hardware sensor design, data calibration, and predictive modeling.

Projects

Hyperspectral Remote-Sensing Foundation Model March 2026 – Present

- Developing temporal hyperspectral foundation models to differentiate healthy vs. stressed vegetation through self-supervised learning of latent-space temporal trajectories.

Landsat Surface Temperature and Uncertainty

- Designed and implemented an XGBoost pipeline to estimate per-pixel atmospheric water vapor from Landsat thermal bands 10 and 11 using MODIS and AERONET observations as reference data, with feature engineering and selection; validated estimates against independent microwave radiometer measurements.
- Developed a split-window surface-temperature uncertainty framework incorporating water-vapor-dependent uncertainty through metrological propagation, advancing the single-channel methodology for potential integration into Landsat Collection 3.
- Advised an undergraduate co-op student contributing to the project.

Scene Constructor: Large-Scale DIRSIG Simulation Tool Jan 2024 – Present

- Created an automated pipeline to generate radiometrically accurate, Landsat-scale simulated scene imagery across reflective and thermal bands for sensor trade studies.

Multimodal Data Fusion for Drone Hyperspectral Imaging Jan 2023 – Present

- Designed computer vision algorithms to correct sub-pixel misalignment across multi-drone pushbroom hyperspectral sensors.
- Built interactive GUIs and desktop utilities to streamline laboratory data processing and visualization workflows.

Imbalanced 3D LiDAR Voxel Content Estimation in Simulated Forests Using Deep Learning Jan 2023 – Jan 2025

- Developed and designed a deep learning architecture for estimating voxel content percentage (bark, leaf, soil, manmade) from limited voxel information (voxel location and intensity) in simulated forests (Harvard Forest) in an imbalanced data setting.

Jostar: Open-Source Feature Selection Library 2020 – 2022

- Developed and published an open-source Python feature selection package (github.com/amirhszd/jostar) featuring 9 optimization algorithms compatible with Scikit-Learn.

Grants & Sponsored Research

Stress Detection in Specialty Crops by Hyperspectral Imaging and Machine Learning: A Case Study of Stemphylium Leaf Blight of Onion
Specialty Crop Block Grant Program (NYFVI), 2025.
Total Award: $200,000 **Duration:** 2 Years

Mentorship

- **Ian Choi** — M.S. Imaging Science. Project: *Standardizing Open Remote Sensing Datasets with DIRSIG Simulation for GeoAI Foundation Models.* (2026 – Present)
- **Robert Mancini** — B.S. Imaging Science. Project: *Improving Landsat 8/9 Surface Temperature Uncertainty via Atmospheric Water Vapor Estimation.* (2024 – 2025)

Professional Service

Journal & Conference Reviewer: Remote Sensing of Environment (RSE), IEEE TGRS, Remote Sensing, Plant Disease Journal, Field Crops Research, Journal of Applied Remote Sensing (JARS), Journal of Open Source Software (JOSS), Journal of Supercomputing, IGARSS, SciPy Conference.

Publications

Hassanzadeh, A., Krawczyk, B., Saunders, M., Wible, R., Krause, K., Dera, D., & van Aardt, J. (**2026**). Deep Imbalanced Multi-Target Regression: 3D Point Cloud Voxel Content Estimation in Simulated Forests. *IEEE Transactions on Geoscience and Remote Sensing.*

Hassanzadeh, A., Mancini, R., Gerace, A., Eon, R., & Montanaro, M. (**2026**). Development of an Uncertainty Workflow to Support Landsat TIRS Split Window-Derived Surface Temperature Products. *Remote Sensing of Environment* (In review); arXiv:2511.12729.

Zhang, F., Chancia, R., Clapp, J., **Hassanzadeh, A.**, Dera, D., MacKenzie, R., & van Aardt, J. (**2025**). Through the Perspective of LiDAR: A Feature-Enriched and Uncertainty-Aware Annotation Pipeline for Terrestrial Point Cloud Segmentation. arXiv:2510.06582.

Zhang, F., **Hassanzadeh, A.**, Letendre, P., Kikkert, J., Pethybridge, S., & van Aardt, J. (**2025**). Enhancing snap bean yield prediction through synergistic integration of UAS-Based LiDAR and multispectral imagery. *Computers and Electronics in Agriculture*, 230, 109923.

Saif, M. S., Chancia, R., Pethybridge, S., Murphy, S. P., **Hassanzadeh, A.**, & van Aardt, J. (**2023**). Forecasting Table Beet Root Yield Using Spectral and Textural Features from Hyperspectral UAS Imagery. *Remote Sensing*, 15(3), 794.

Zhang, F., **Hassanzadeh, A.**, Kikkert, J., Pethybridge, S. J., & van Aardt, J. (**2022**). Evaluation of Leaf Area Index (LAI) of Broadacre crops using UAS-Based LiDAR point clouds and multispectral imagery. *IEEE JSTARS*, 15, 4027-4044.

Hassanzadeh, A. (**2022**). *On the Use of Imaging Spectroscopy from Unmanned Aerial Systems (UAS) to Model Yield and Assess Growth Stages of a Broadacre Crop.* Ph.D. Dissertation, Rochester Institute of Technology.

Hassanzadeh, A., Zhang, F., Murphy, S. P., Pethybridge, S. J., & van Aardt, J. (**2021**). Toward Crop Maturity Assessment via UAS-Based Imaging Spectroscopy—A Snap Bean Pod Size Classification Field Study. *IEEE TGRS*, 60, 1-17.

Zhang, F., **Hassanzadeh, A.**, Kikkert, J., Pethybridge, S. J., & van Aardt, J. (**2021**). Comparison of uas-based structure-from-motion and lidar for structural characterization of short broadacre crops. *Remote Sensing*, 13(19), 3975.

Hassanzadeh, A., Zhang, F., van Aardt, J., Murphy, S. P., & Pethybridge, S. J. (**2021**). Broadacre crop yield estimation using imaging spectroscopy from unmanned aerial systems (UAS): A field-based case study with snap bean. *Remote Sensing*, 13(16), 3241.

Hassanzadeh, A., Murphy, S. P., Pethybridge, S. J., & van Aardt, J. (**2020**). Growth stage classification and harvest scheduling of snap bean using hyperspectral sensing: A greenhouse study. *Remote Sensing*, 12(22), 3809.

Hassanzadeh, A., van Aardt, J., Murphy, S. P., & Pethybridge, S. J. (**2020**). Yield modeling of snap bean based on hyperspectral sensing: a greenhouse study. *Journal of Applied Remote Sensing*, 14(2), 024519.

Posters, Talks & Conferences

Eon, R. S., **Hassanzadeh, A.**, Gerace, A. D., & Montanaro, M. (**2025**). Assessing Surface Temperature Retrieval Uncertainty for Landsat Next Using DIRSIG. *AGU Fall Meeting 2025.*

Hassanzadeh, A., Gerace, A. D., & Eon, R. S. (**2024**). On Split-Window Algorithm Uncertainty Improvement for Landsat 8 & 9: Total Precipitable Water Estimation. *AGU Fall Meeting 2024.*

Gerace, A. D., Goodenough, A. A., **Hassanzadeh, A.**, Eon, R. S., & Montanaro, M. (**2024**). Leveraging the DIRSIG model to simulate proxy data for the Landsat Instrument Suite (LandIS). *AGU Fall Meeting 2024.*

Hassanzadeh, A., Macalintal, J. N. G. M., & Messinger, D. (**2024**). Preserving legacies, pioneering frontiers: Multi-sensor image fusion, from medieval manuscripts to UAS-based sensing. *SPIE Defense + Commercial Sensing*, 13031, 59–69.

Zhang, F., **Hassanzadeh, A.**, Kikkert, J., Pethybridge, S. J., & van Aardt, J. (**2022**). White Mold and Weed Detection in Snap Beans Using UAS-Based Lidar. *IEEE IGARSS 2022*, 7779-7782.

Hassanzadeh, A., & van Aardt, J. (**2021**). UAS-based Crop Yield Prediction Via Hyperspectral Imaging Using a Novel Feature Selection Module. *AGU Fall Meeting 2021*.

Hassanzadeh, A., van Aardt, J. A., Zhang, F., Murphy, S. P., & Pethybridge, S. J. (**2020**). Multi-objective Wavelength Selection for Snap-bean Yield Assessment Using Remote Sensing: A Field Study. *AGU Fall Meeting 2020*.

Zhang, F., **Hassanzadeh, A.**, Kikkert, J., Pethybridge, S., & van Aardt, J. (**2020**). Toward a structural description of row crops using UAS-based LiDAR point clouds. *IEEE IGARSS 2020*, 465-468.

Hassanzadeh, A., Murphy, S. P., Pethybridge, S. J., van Aardt, J., & Zhang, F. (**2020**). Toward maturity assessment of snap bean crops: A best-case greenhouse scenario. *IEEE IGARSS 2020*, 5278-5281.

Hassanzadeh, A., van Aardt, J. A., Pethybridge, S. J., & Murphy, S. P. (**2019**). Yield Modelling and Harvest Scheduling of Snap-bean Using Remote Sensing: A Greenhouse Study. *AGU Fall Meeting 2019*.