Amir Hassanzadeh

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U.S. Permanent Resident

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*

Technical Skills

Machine Learning & AI: PyTorch, TensorFlow, Keras, Scikit-learn, Hugging Face, Weights & Biases, OpenCV, Transformers, Masked Autoencoders, Self-Supervised Learning, Contrastive Learning, Continual Learning
Remote Sensing & Geospatial: Hyperspectral Imaging, LiDAR, Thermal Remote Sensing, Multispectral Imaging, Google Earth Engine, STAC, GDAL, Rasterio, GeoPandas, Xarray, Dask, QGIS, ENVI
Physical Modeling & Simulation: DIRSIG, MODTRAN, DGGRID, Radiative Transfer, Sensor Modeling, Photogrammetry
Scientific Computing & Software: Python, MATLAB, Java, SQL, NumPy, SciPy, Pandas, Docker, CUDA, Linux/Bash, Git/GitHub, Conda, LaTeX

Professional Experience

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

- Lead independent and collaborative research programs in remote sensing and GeoAI, including proposal development, technical direction, and student supervision.
- Secured and lead a $200,000 USDA/NYFVI project on hyperspectral detection of onion disease, while co-leading additional sponsored research and developing new research directions with faculty collaborators.
- Build research partnerships with NASA, USGS, DARPA, Cornell, and industry through collaborative projects, proposals, and conference engagement.

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

- Contributed technical expertise across multiple sponsored remote-sensing research programs, collaborating with interdisciplinary teams on algorithm development, simulation, validation, and scientific analysis.
- Supported proposal development, technical reporting, and sponsor-facing meetings with organizations including USGS, translating technical results into clear presentations for both scientific and non-technical audiences.
- Advised undergraduate researchers and collaborated across research groups within the Center for Imaging Science, contributing to project execution, knowledge transfer, and cross-team technical development.

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

- Developed an end-to-end Mask R-CNN pipeline for segmenting corn crop damage from UAS imagery, enabling insurance-focused field-scale damage estimation as an alternative to manual random sampling.
- Built and documented a reusable Python library, benchmarked alternative approaches for accuracy and computational performance, and collaborated with software engineers and agronomists to deliver a client-sponsored solution.

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

- Developed LiDAR and RGB segmentation pipelines for asset inventory from point-cloud and aerial imagery.
- Achieved $> 90\%$ accuracy for RGB-based power-pole segmentation and delivered backend workflows that increased automation of analyst-driven asset inventory.

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

- 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 data calibration, and predictive modeling.

Projects

Temporal Hyperspectral Representation Learning for Biotechnology March 2026 – Present

- Designed a self-supervised spectral, spatial, and temporal attention masked-autoencoder, using FiLM metadata conditioning and adversarial domain prediction to disentangle acquisition effects from collection geometry in the latent space.
- Developed data-processing pipelines spanning greenhouse, UAS, and EO-1 Hyperion satellite data, including the 4.5-TB ChronoEarth dataset with $\sim 500K$ image chips and up to 235 timestamps spanning 17 years
- Investigating latent-space trajectories of healthy and stressed vegetation by suppressing collection-geometry and environmental variability, with representation quality evaluated through downstream segmentation tasks.

Landsat Split-Window Surface Temperature Uncertainty Framework June 2022 - Present

- Developed a supervised water vapor retrieval algorithm using Landsat 8/9 TIRS Bands with MODIS/AERONET reference data, incorporating feature engineering and selection; validated against microwave radiometer observations ($R^2 = 0.81$) for potential integration into USGS EROS workflow for Landsat Collection 3.
- Integrated it into an uncertainty-propagation framework for Landsat surface temperature product.
- Developed a Landsat 8/9 split-window uncertainty framework through metrological uncertainty propagation that improves upon the existing single-channel methodology incorporating water vapor retrieval uncertainty.

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

- Architected a scalable DIRSIG scene-construction framework to overcome large-area numerical precision limitations; collaborated with the DIRSIG team to leverage multi-threaded simulation and discrete global gridding and indexing, enabling state-scale scenes beyond the previous patch-based approach.
- Co-developed and automated a Google Earth Engine and geospatial pipeline integrating DEMs, Sentinel-2 surface reflectance, and ECOSTRESS emissivity data, with harmonized scene assets spanning the CONUS; independently extended the framework to thermal simulation using ASTER GED, MODTRAN, and GEOS-5.
- Applied the framework with NASA and Raytheon to Landsat Next sensor trade studies, modeling its 26-band architecture in DIRSIG and evaluating radiometric performance under candidate compression and decompression schemes prior to launch.

Multimodal Data Fusion for Drone Hyperspectral Imaging Jan 2023 – Dec 2025

- Developed SPLASH, a computer vision approach for co-registering VNIR and SWIR pushbroom hyperspectral imagery collected from separate UAS platforms, enabling pixel-level multimodal fusion.
- Designed a three-stage workflow using manual co-registration, roll-error correction, and elastic co-registration with Anstpy; incorporated snapshot framing-array multispectral imagery to mitigate pushbroom artifacts.
- Built GUI tooling for hyperparameter tuning and validated registration accuracy using field-deployed Tyvek fiducials and ground-reference RMSE before and after correction; benchmarked the approach against published methods in a submitted paper.

3D LiDAR Voxel Content Estimation in Simulated Forests Jan 2023 – Jan 2025

- Formulated voxel-content recovery as an imbalanced multi-target regression problem, estimating bark, leaf, soil, and other material fractions from sparse voxel descriptors to study information loss introduced by point-cloud voxelization.
- Designed a kernel point-cloud architecture and benchmarked it against alternative machine learning and deep learning models, incorporating imbalance-aware loss weighting, transfer learning, and fine-tuning.
- Performed ablation and sensitivity analyses across voxel sizes using DIRSIG simulations of a drone-mounted Velodyne VLP-16 over RIT's Harvard Forest scene, establishing a controlled baseline for future scaling to real-world LiDAR data.

PhD Thesis: Yield Modeling and Harvest Scheduling of Row Crops 2018 – 2022

- Collaborated with Cornell scientists and growers to develop hyperspectral methods for early snap-bean yield and harvest forecasting, identifying a 10–15 day pre-harvest window for actionable yield estimation and field-level sieve-size mapping.
- Independently designed and executed controlled greenhouse spectroscopy experiments, including sensor setup, calibration, repeated data collection, and ground-truthing; extended the work to UAV hyperspectral field campaigns with Cornell-provided ground truth.
- Developed machine learning and feature-selection pipelines for hyperspectral analysis and released Jostar, an open-source Scikit-learn-compatible feature selection library using metaheuristic optimization; the thesis work resulted in six peer-reviewed publications.

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

Teaching & Mentorship

- **Instructor** — *Applications of Machine Learning in Remote Sensing*, Rochester Institute of Technology. Graduate and undergraduate course. (2026 – Present)
- **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.

Conference Presentations & Proceedings

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*.