

Aditya Dutt, Ph.D.

Postdoctoral Associate, Department of Electrical and Computer Engineering
University of Florida, Gainesville, FL, 32608
aditya.dutt@ufl.edu | linkedin.com/in/adityadutt12

Education

University of Florida

- Ph.D. in Computer and Information Science and Engineering Aug 2019–May 2025
Dissertation: *A Multimodal Alignment Network for Domain Translation and Fusion*
Advisor: Dr. Alina Zare
- M.S. in Computer and Information Science and Engineering Jan 2018–May 2019
- B.Tech. (Semester Exchange) in Computer and Information Science and Engineering Jan 2017–May 2017

Jaypee Institute of Information Technology

- B.Tech. in Computer Science Aug 2013–Dec 2016

Publications

Peer-Reviewed Journal Papers

3. **Dutt, A.**, & Gader, P. (2023). Wavelet multiresolution analysis based speech emotion recognition system using 1D CNN LSTM networks. *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, 31, 2043-2054.
2. **Dutt, A.**, Zare, A., & Gader, P. (2022). Shared manifold learning using a triplet network for multiple sensor translation and fusion with missing data. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 15, 9439-9456.
1. Kumar, S., Pant, M., Kumar, M., & **Dutt, A.** (2018). Colour image segmentation with histogram and homogeneity histogram difference using evolutionary algorithms. *International Journal of Machine Learning and Cybernetics*, 9, 163-183.

Conference Proceedings

1. Zhou, M., **Dutt, A.**, & Zare, A. (2025). Multi-Task Learning with Multi-Annotation Triplet Loss for Improved Object Detection. Accepted to the IEEE International Geoscience and Remote Sensing Symposium (IGARSS) 2025. arXiv preprint [arXiv:2504.08054](https://arxiv.org/abs/2504.08054).

Manuscripts Under Review

1. Manuscript under review at WACV 2027, Applications Track (double-blind).

Preprints

1. **Dutt, A.**, Gader, P., & Singh, A. (2026). Joint utilization of geospatial and census proxies for autoencoder-assisted downscaling (JUGAAD) of socioeconomic indicators in India. *arXiv preprint* [arXiv:2607.20559](https://arxiv.org/abs/2607.20559).

Research Experience

Postdoctoral Associate

Feb 2026–Present

Machine Learning and Sensing Laboratory, Department of Electrical and Computer Engineering, University of Florida
Supervisor: Dr. Alina Zare

Project Title: DSFAS: Getting to the Core of Roots: Model-Informed Machine Learning for Phenotyping and Mapping

- Developing diffusion models that translate simulated root skeletons into realistic 3D root structures for X-ray CT segmentation.

- Developing domain-adaptation methods to bridge geometric and imaging gaps between simulated roots and real X-ray CT data.
- Developing weakly supervised graph neural networks for root segmentation using synthetic labels and incomplete annotations from real CT scans.

Project: AI-Based Switchgrass Phenotyping from Drone Imagery

- Processed drone imagery through orthorectification and mosaicking to support downstream analysis.
- Developed a spatiotemporal AI model to predict biomass, moisture content, plant height, emergence dates, and flowering dates in switchgrass.

Postdoctoral Associate

Nov 2025–Feb 2026

Computational Microscopy Imaging Lab (CMIL), University of Florida

Supervisor: Dr. Pinaki Sarder

Served as project manager for a software engineering team, coordinating three computational pathology projects within a federally funded, multi-institutional precision kidney health initiative.

- Coordinated development of FUSION 1.0, a platform integrating kidney whole-slide histology with 10x Visium spatial transcriptomics for FTU-level segmentation, morphometric feature extraction, spatial aggregation, and visualization, and contributed to its ongoing extension for Xenium analysis.
- Worked on 10x Visium cell-type deconvolution to compare cellular composition across multiple kidney conditions.

Postdoctoral Associate

June 2025–Nov 2025

Machine Learning and Sensing Laboratory, Department of Electrical and Computer Engineering, University of Florida

Supervisor: Dr. Alina Zare

Project Title: DSFAS: Getting to the Core of Roots: Model-Informed Machine Learning for Phenotyping and Mapping

- Aimed to generate realistic X-ray CT scans of switchgrass soil cores to support root segmentation, addressing the challenge that real CT scans are time-intensive and costly to annotate.
- Developed a graph convolutional neural network (GCNN)-based generative adversarial network (GAN) for domain translation, converting synthetic root point clouds into realistic X-ray CT scan representations.
- Leveraged the generated CT scans to train segmentation algorithms for identifying root structures within soil cores.
- Fine-tuned the segmentation models on real CT data using weakly supervised labels, enabling improved generalization from fake to real domains.

Graduate Research Assistant

Jan 2025–May 2025

Project Title: DSFAS: Getting to the Core of Roots: Model-Informed Machine Learning for Phenotyping and Mapping

- Developed dynamic graph convolutional neural networks for root segmentation in X-ray CT scans.
- Integrated root-architecture simulations with graph neural networks to improve segmentation under limited supervision.

Graduate Research Assistant

Jan 2021–Dec 2024

Project Title: Adaptive Manifold Learning for Multi-Sensor Translation and Fusion given Missing Data

- Developed a contrastive learning and shared manifold-based deep learning framework to map multiple heterogeneous modalities in a common latent space.
- Performed fusion-based classification and one-to-many domain translations (generated synthetic data) using the shared manifold.
- Evaluated the method on remote sensing datasets involving modalities like synthetic aperture radar (SAR), optical images, LiDAR, and hyperspectral images.
- Analyzed techniques to mitigate mode collapse during training to ensure diversity and stability in generated outputs.
- Investigated sources of inaccuracy and noise in domain translations and analyzed where and why translation failures or inconsistencies occur.
- The method is particularly relevant for industry applications, where new sensors can be mapped to a shared manifold, avoiding the need for separate classification pipelines for each sensor, thus saving extra development costs.

Graduate Research Assistant

Jan 2020–Dec 2020

Project Title: Landscapes In Flux: The Influence of Demographic Change and Institutional Mechanisms on Land Cover Change, Climate Adaptability and Food Security in Rural India

- Estimated poverty and food security indicators across economically depressed regions of India by analyzing regional patterns of land cover change.
- Created a dataset to gather and analyze data from India's National Sample Survey Office. Data is comprised of housing conditions, employment, and agricultural assessment surveys of India.
- Implemented a novel deep-learning-based method of utilizing geospatial data to downscale over two hundred fine-grained socioeconomic indicators to the village cluster scale in India.
- These indicators were utilized to assess changes in variations in indicators of poverty, livelihood sustainability, and quality of life in regions proximal to highly biodiverse and/or protected regions across the country across a decade.

Teaching Experience

Graduate Teaching Assistant

Aug 2019–Dec 2019

Course: Distributed Operating Systems (Dept. of Computer and Information Science and Engineering, UF)

Instructor: Dr. Alin Dobra

- Created course assignments that were approved by the supervising professor. Managed one Teaching Assistant and one Course Grader. Held weekly office hours, graded coursework, and provided one-to-one guidance to students.
- Assisted with creating projects (and grading system) based on Twitter implementation and gossip algorithms in Elixir using the actor model to simulate the dissemination of information across a network using Honeycomb and 3D Torus.
- Received an end-of-semester evaluation score of "Outstanding" based on instructor's feedback.

Master's Student Mentoring Experience

Project: Speech Emotion Classification

Jan 2022–Apr 2022

- Guided a student to collect data from movies and TV shows and build a dataset for an emotion classification task.
- Taught the student how to process raw speech data and work with Spectrograms, Mel spectrograms, and other feature extraction methods.
- Helped the student build a Convolutional Neural network to classify video clips with different facial emotions.

Project: Landcover Classification using Hyperspectral and LiDAR Data

Jan 2022–Apr 2022

- Assisted the student in processing LiDAR data from LAZ files and constructing an elevation model.
- Helped the student analyze LiDAR statistics to differentiate between various land cover classes.
- Guided the development of a neural network classifier for LiDAR and hyperspectral data, both separately and with data fusion techniques.

Selected Projects

• Speech Emotion Recognition (SER) using Wavelet Multiresolution Analysis

Jan 2022–Jul 2023

- Investigated the competency of the Wavelet transforms for SER as the multiresolution property of wavelets can provide good localization in both time and frequency domains, unlike Fourier transforms.
- Developed a method called Wavelet-based Deep Emotion Recognition (WaDER) method using an autoencoder, 1D convolutional neural network (CNN), and long short-term memory (LSTM) networks to classify wavelet features.
- Work published in IEEE TASLP in 2023.

• Cancer Cell Segmentation

Jan 2020–Dec 2020

- Worked on nuclei segmentation of pathology whole slide images (H&E slides).
- Initially applied blob segmentation algorithms such as active contours and watershed.
- Applied U-Nets for segmentation to address challenges like color variation and non-uniform backgrounds.

• Lexicon-Based Segmentation of Offline Cursive Handwriting

Jan 2019–May 2020

- Developed an algorithm for cursive handwriting recognition using the CEDAR dataset.
- Implemented connected component analysis and distance transform for word segmentation.

- Created possibilistic target outputs to handle overlapping classes effectively. Used dynamic programming and CNN to match lexicon strings with segments.
 - Applied Siamese/Triplet networks to improve accuracy and address the class imbalance problem.
- **Mussel Mounds Detection with Aerial Imagery** Aug 2019–Dec 2019
 - Explored image-processing based methods to identify settlements of mussels. Filtered water and green region near coastal areas by converting image from RGB to HSV format and applying several color masks using Scikit and OpenCV libraries. Successfully detected greenish gray mounds through grayscale thresholding and circular blob detection. Filtered blobs within threshold size. Matched results with LIDAR ground truth data to validate detection results.

Presentations

4. I. Ansari, **A. Dutt**, and P. Sarder. (2026). FUSION 1.0: Integrating Kidney Whole Slide Histology with 10x Visium Spatial Transcriptomics for Functional Tissue Unit (FTU)-Level Analysis. **Poster Presentation**, College of Medicine Celebration of Research, University of Florida. (*Presenter: I. Ansari*)
3. Diaz, J., **Dutt, A.**, Zare, A., Kim, S. H., Fritschi, F. B., Zerrade, S., & Corcoro, C. (November 2025). Synthetic Root Architecture Modeling–Guided Segmentation of Real X-Ray CT Point Clouds of Soil Cores Using Weak Ground Truth Labels in Switchgrass (*Panicum virgatum*). **Oral Presentation** at the CANVAS 2025 Conference, Utah. (*Presenter: J. Diaz*)
2. Diaz, J., **Dutt, A.**, & Zare, A. (October 2025). Getting to the Core of Roots: Segmentation of CT-Scan Point Clouds Using Weak Ground Truths. **Poster Presentation** at AI Days 2025, University of Florida, Gainesville, FL. (*Presenter: J. Diaz*)
1. **Dutt, A.** (October 2024). COMMANet: A Contrastive Multi-Modal Alignment Network for Domain Translation and Fusion. **Poster Presentation** at AI Days 2024, University of Florida, Gainesville, FL. (*Presenter: A. Dutt*)

Journal Reviewer Experience

- IEEE Transactions on Geoscience and Remote Sensing (TGRS): 4 reviews
- IEEE Sensors Journal: 5 reviews
- IEEE Geoscience and Remote Sensing Letters: 1 review