OISHEE BINTEY HOQUE

(937) 739–9375 Charlottesville, VA

oishee@virginia.edu ◇ /oishee-hoque ◇ oishee-hoque.github.io

EDUCATION

Ph.D. in Computer Science, University of Virginia *Aug 2021 – July 2026 (Expected)*

Specialization: Knowledge-Guided Machine Learning, Multimodal Understanding, Vision-Language Models (VLMs), Remote Sensing

- UVA Endowed Fellowship, awarded to **20–25 top doctoral students** in the UVA School of Engineering & Applied Science (SEAS).

M.S. in Computer Science, University of Virginia *Charlottesville, VA — May 2025*

Relevant Coursework: Machine Learning (ML), ML in Image Processing, Interpretable ML, Design and Analysis of Algorithms, NLP, Mobile and IoT Security, Software Security via Program Analysis, 3D Computer Vision

TOP PUBLICATIONS

For a comprehensive list, visit my Google Scholar Profile

1. **Oishee Bintey Hoque**, [6 other Co-Authors], "*PRISM-CAFO: Prior-conditioned remote-sensing infrastructure segmentation and mapping for CAFOs*," in *The IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*, Accepted, 2026.
2. **Oishee Bintey Hoque**, [6 other Co-Authors], "*IRRISIGHT: A Large-Scale Multimodal Dataset and Scalable Pipeline to Address Irrigation and Water Management in Agriculture*," in *Advances in Neural Information Processing Systems (NeurIPS)*, 2025.
3. **Oishee Bintey Hoque**, [9 other Co-Authors], "*IrrMap: A Large-Scale Comprehensive Dataset for Irrigation Method Mapping*," in *ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, 2025.
4. **Oishee Bintey Hoque**, [6 other Co-Authors], "*Knowledge-Informed Deep Learning for Irrigation Type Mapping from Remote Sensing*," in *International Joint Conference on Artificial Intelligence (IJCAI)*, 2025.
5. **Oishee Bintey Hoque**, [8 other Co-Authors], "*Learning to Identify Infrastructure Networks from Satellite Imagery by Iterative Graph-constrained Semantic Segmentation (IGraSS)*," in *International Joint Conference on Artificial Intelligence (IJCAI)*, 2025.
6. **Oishee Bintey Hoque**, [4 other Co-Authors], "*IrrNet: Advancing Irrigation Mapping with Incremental Patch Size Training on Remote Sensing Imagery*," in *IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*, Vision for Agriculture, 2024.

EXPERIENCE

Graduate Research Assistant, *University of Virginia, Biocomplexity Institute, Charlottesville, VA* Aug 2021 – Present

Tech Stack: Python, PyTorch, Hugging Face, Transformers, scikit-learn, Rasterio, GDAL, QGIS, LLMs, VLMs, NumPy, Pandas, OpenCV

- **Knowledge-Guided Learning:**
  - Developed the ***KIIM*** framework integrating crop–irrigation domain priors with multi-stream cross-attention transformers.
  - Enhanced cross-regional generalization, achieving **+22.9% overall IoU** and **+71% improvement** on minority irrigation types over SOTA models. (IJCAI'25)
- **Geospatial and Multimodal AI:**
  - Built **two large-scale geospatial datasets** (*>1M labeled patches*) integrating multispectral imagery and environmental features at 10m resolution.
  - Generated structured text features for vision–language modeling and established scalable, reproducible pipelines for knowledge-informed machine learning. (NeurIPS'25, KDD'25)
- **Infrastructure Segmentation:** Developed the ***IGraSS*** framework coupling deep semantic segmentation with graph-based topology refinement, improving network connectivity and achieving a **5.6% IoU gain** on thin-structure infrastructure mapping tasks. (IJCAI'25)
- **Infrastructure-Guided Vision:**
  - Developed ***CAFOSat*** benchmark with a Grad-CAM–guided human-in-the-loop refinement pipeline that localizes misaligned regions and upgrades weak geolocations into precise site annotations, improving classification accuracy by **+10–15%** across SOTA models and external datasets.
  - Developed the ***PRISM-CAFO*** framework using an object-first pipeline that detects and segments agricultural infrastructure prior to classification.
  - Integrated object-level features with domain priors and attention mechanisms to enhance interpretability, achieving a **+15% F1** improvement over SOTA models. (WACV 2026)

Research Intern, *USDA–NIFA / NSF AI Institute for Next Generation Food Systems (AIFS)* Jun 2023 – Aug 2023

Tech Stack: Python, TensorFlow, Keras, scikit-learn, ArcGIS, Google Earth Engine

- **Experimented with multi-channel** Landsat imagery and spectral indices to evaluate feature sensitivity and identify optimal band combinations for irrigation mapping.
- Implemented **Incremental Patch-size Training** and benchmarked performance improvements, achieving ∼20% F1 gains over state-of-the-art baselines. (*Oral Presentation at* **(V4A)**, CVPR 2024)

Software Engineer, *Enosis Solutions, Dhaka, Bangladesh* Aug 2020 – Jul 2021

Tech Stack: C#, ASP.NET MVC, React.js, Node.js, Express.js, MongoDB, SQL Server, REST APIs, Git, Jira

- Collaborated with a 6–8 member team to develop an Incident Management Tool in C# (MVC) and a full-stack web platform for ML model training/testing, delivering production-ready code through iterative review and deployment.

OTHER PROJECTS

Bangladeshi Sign Language Recognition Series Jan 2018 – Dec 2020

Tech Stack: Python, TensorFlow, OpenCV, Keras, CNN, LSTM

- Created three pioneering works in sign language recognition:
  - **BdSL36 (ACCV 2020)**: Built and released the first Bangladeshi Sign Language dataset and engineered background augmentation using synthetic scene blending, improving real-world recognition accuracy by $> 10\%$ and enabling deployment-ready sign recognition systems.
  - **Real-Time BdSL Detection (ICIET 2018)**: Applied Faster R-CNN for sign letter detection at real-time.
  - **BdSLVidSet**: Built sequential dataset for dynamic sign-word recognition using CNN feature extraction and LSTM sequence modeling.

COVID-19 Detection using HRNet and UNet Segmentation Jan 2021 – Aug 2021

Tech Stack: Python, PyTorch, HRNet, UNet, OpenCV

- Developed an automated COVID-19 diagnostic pipeline combining UNet-based lung segmentation with HRNet classification, achieving **99.26% accuracy** and outperforming prior CNN models.

RECOGNITION & SERVICE

- **Research Spotlights**: Recognized by USDA *SCINet Newsletter* (Jul 2025) for "Advancing Irrigation Mapping Through AI and Remote Sensing," and by *ACM Kudos* (2025) for highlighting the paper "IrrMap: A Large-Scale Comprehensive Dataset for Irrigation Method Mapping." ([SCINet], [ACM Kudos])
- **Awards**:UVA Endowed Fellowship — awarded to 20–25 outstanding doctoral students in SEAS ($12,000); and USDA–ARS AI-COE/SCINet Graduate Student Fellowship; Undergraduate Merit Award — Dean's List of Honor, AUST (2019).
- **Reviewer**: CVPR Workshop on Vision for Agriculture (V4A).
- **Competitions**: Achieved 3rd Place at AgAthon 2023 (*AgAID Digital Hackathon*); 11th Place (out of 120 teams) at National Girls Programming Contest 2018; and 5th Place at Intra-AUST Programming Contest (Spring 2016).
- **Leadership**: Served as Space & Media Chair (2022) and Social Chair (2024) for the UVA Computer Science Graduate Student Group (CSGSG) Council, organizing community events and outreach initiatives.