OISHEE BINTEY HOQUE

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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* 🎓

1. **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)*, Accepted, 2025.

2. **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. 📄

3. **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. 📄

4. **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. 📄

5. **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. (Under Review @ WACV 2025)

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.