Oishee Bintey Hoque

gza5dr@virginia.edu
in/oishee-hoque
https://oishee-hoque.github.io/
https://github.com/oishee-hoque

Education

2021 – 2026 (Expected) **Ph.D. in Computer Science, University of Virginia (UVA)**
Specialization: Knowledge-Guided Machine Learning, Multimodal Understanding, VLMs, Remote Sensing.

2025 **M.S. in Computer Science, University of Virginia (UVA)**
Relevant Courses: Machine Learning, Image Processing ML, Interpretable ML, Design and Analysis of Algorithms, NLP, Mobile and IoT Security, Software Security via Program Analysis, 3D Computer Vision.

2019 **B.Sc. in Computer Science, Ahsanullah University of Science and Technology (AUST)**
Award: Graduated with Dean's List of Honor.

Research Publications

*Author name followed by et al. indicates the first author.

Conference Proceedings

1. **O. B. Hoque** *et al.*, "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. **O. B. Hoque** *et al.*, "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.
3. **O. B. Hoque** *et al.*, "IrrMap: A Large-Scale Comprehensive Dataset for Irrigation Method Mapping," in *ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, 2025. DOI: https://doi.org/10.1145/3711896.3737380.
4. **O. B. Hoque** *et al.*, "Knowledge-Informed Deep Learning for Irrigation Type Mapping from Remote Sensing," in *International Joint Conference on Artificial Intelligence (IJCAI)*, 2025. DOI: https://doi.org/10.24963/ijcai.2025/1077.
5. **O. B. Hoque** *et al.*, "Learning to Identify Infrastructure Networks from Satellite Imagery by Iterative Graph-constrained Semantic Segmentation IGraSS," in *International Joint Conference on Artificial Intelligence (IJCAI)*, 2025. DOI: https://doi.org/10.24963/ijcai.2025/1076.
6. **O. B. Hoque** *et al.*, "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. DOI: 10.1109/CVPRW63382.2024.00555.
7. **O. B. Hoque** *et al.*, "Autonomous Deblurring of Images and Information Extraction from Documents Using CycleGAN and Mask R-CNN," in *Proceedings of the 23rd International Conference on Computer and Information Technology (ICCIT)*, 2020, pp. 1–6. DOI: 10.1109/ICCIT51783.2020.9392717.
8. **O. B. Hoque** *et al.*, "BdSL36: A Dataset for Bangladeshi Sign Letters Recognition," in *Asian Conference on Computer Vision Workshops (ACCVW)*, 2020. DOI: 10.1007/978-3-030-69756-3_6.

9. **O. B. Hoque** *et al.*, "Real-Time Bangladeshi Sign Language Detection Using Faster R-CNN," in *International Conference on Innovations in Engineering and Technology (ICIET)*, 2018. DOI: 10.1109/CIET.2018.8660780.

Journal Articles

1. S. K. Nouwakpo, D. Bjorneberg, K. McGwire, and **O. B. Hoque**, "Mapping Irrigation Methods in the Northwestern US Using Deep Learning Classification," *Water Resources Research*, vol. 60, no. 8, e2023WR036155, 2024. DOI: 10.1029/2023WR036155.
2. **O. B. Hoque** *et al.*, "COVID-19 Non-pharmaceutical Interventions: Data Annotation for Rapidly Changing Local Policy Information," *Scientific Data*, 2023. DOI: https://doi.org/10.1038/s41597-023-01979-6.
3. S. Ahmed, T. Hossain, **O. B. Hoque**, *et al.*, "Automated COVID-19 Detection from Chest X-Ray Images: A High-Resolution Network (HRNet) Approach," *SN Computer Science*, vol. 2, no. 4, pp. 1–9, 2021. DOI: https://doi.org/10.1007/s42979-021-00690-w.

Under Review

1. **O. B. Hoque** *et al.*, "CAFOSat: A Strongly Annotated Dataset for Infrastructure-Aware CAFO Mapping Using High-Resolution Imagery," Under Review, 2025.

Experience

Research Experience

Graduate Research Assistant, University of Virginia (2021 – Present)
***Tech**: Python, TensorFlow, PyTorch, Pandas, Rasterio, NumPy, Matplotlib, scikit-learn, OpenCV, QGIS, Jupyter, Remote Sensing.*

- Released **IrrMap** dataset (1.1M patches, 14M acres), the first of its kind with *a full ML-Ready pipeline* for irrigation mapping research.
- Built **IRRISIGHT**, the *largest* publicly available *multimodal dataset* for agricultural water management (**1.4M samples**), integrating satellite imagery, soil/crop metadata, and textual prompts; fully *ML-ready* and achieved +3.8% Dice improvement over RGB-only baselines in Irrigation Mapping.
- Designed **KIIM**, a Swin Transformer–based knowledge-guided irrigation mapping model using bidirectional cross-attention and crop-type and land use priors; *boosted IoU for rare drip irrigation by +71.4%*.
- Developed **IGraSS** framework combining segmentation with *graph-theoretic constraints*, reducing unreachable and noisy canal segments from *18% to 3%*.
- Developed the **CAFOSat** pipeline integrating *Grad-CAM–based strong annotation generation*, human-in-the-loop validation, and prompt-guided augmentation (*GroundingDINO, Stable Diffusion Inpainting*) to produce infrastructure-level annotations for *45K+ high-resolution* NAIP patches, enabling scalable livestock facility detection.
- Proposed a **detector-anchored pipeline** (YOLOv8 + SAM2 + geometric filtering) producing *1.3M verified object-level masks* of CAFO infrastructure; built a **mask-guided classifier** combining domain priors with deep features, achieving accuracy competitive with vision-only baselines while improving interpretability.

Experience (continued)

- **Research Intern (Summer 2023)**, USDA-NIFA/NSF AI Institute for Next Generation Food Systems
  - Processed geospatial data to build robust training sets for irrigation mapping tasks.
  - Experimented with multi-channel Landsat imagery and spectral indices to evaluate feature sensitivity and identify optimal band combinations for irrigation classification.
  - Implemented and benchmarked **IrrNet**, an incremental patch-size training framework that improved generalization and delivered ∼10% accuracy gains over state-of-the-art baselines.

Teaching And Mentoring Experience

- **Graduate Teaching Assistant, University of Virginia** [Aug 2021 – Jan 2025]
  - Assisted in grading assignments, and held weekly office hourse for undergraduate and graduate courses.
  - **Mobile Application Development (Fall 2022)**: Guided students in Android/iOS development, emphasizing industry best practices.
  - **Machine Learning (Spring 2023)**: Supported students with implementations; held office hours to address theory and coding challenges.
  - **Digital Signal Processing (Spring 2024)**: Regularly held office hours, to address theory and coding challenges and graded assignments and final projects.
  - **Neural Networks (Spring 2025)**: Graded assignments and final projects for 35–70 students.

- **Undergraduate Mentoring, University of Virginia** [Jun 2025 – Present]
  - Mentoring two 3rd-year Computer Science undergraduates on research in remote sensing and computer vision for agriculture and environmental monitoring.
  - **Jonathan Bierly (Summer'25)**: Guided in dataset preparation and model training for satellite imagery–based irrigation mapping.
  - **Kyle Duong (Summer'25 - Present)**: Supervising research on computer vision pipelines for geospatial analysis, with emphasis on model evaluation and reproducibility.
  - Providing direction on research methodology, coding practices, and paper writing for potential conference submissions.

Industry Experience

- **Software Engineer, Enosis Solutions, Dhaka, Bangladesh** [Aug 2020 – Jul 2021]
  ***Tech**: C#, JavaScript, SQL (MySQL, Oracle), MongoDB, React.js, Node.js, Express.js, MVC Framework, Git, Visual Studio, Jira.*
  - Developed an Incident Management Tool in C# and MVC Framework to track organizational events; reviewed, tested, and deployed to production as part of a 6–8 person team.
  - Designed and implemented a full-stack web platform for training and testing machine learning models.
  - Collaborated with cross-functional teams, including software developers and other departmental staff, to deliver production-ready solutions.

Awards and Recognition

Media and Research Highlights

July 2025
- **Research Spotlight**, SCINet Newsletter: *Advancing Irrigation Mapping Through AI and Remote Sensing*; showcased in the USDA SCINet July 2025 issue. Available online: `https://scinet.usda.gov/news/newsletter/2025-07`
- **Paper Recognition,** "IrrMap: A Large-Scale Comprehensive Dataset for Irrigation Method Mapping," at *KDD 2025* was selected to be highlighted on *ACM Kudos*. Available online: `https://link.growkudos.com/1e1cogkx91c`

Academic Awards

2025
- **Endowed Fellowship**, UVA School of Engineering & Applied Science (SEAS), goes to only 20-25 outstanding doctoral students in SEAS. Awarded $12,000.

2021
- **PhD Fellowship**, UVA CS

2019
- **Merit Award**, Dean's List of Honor, AUST.

Travel Grants

Aug 2025
- International Joint Conference on Artificial Intelligence (IJCAI), to attend IJCAI 2025, Montreal, Canada.

Apr 2025
- Computing Research Association (CRA-WP), to attend Grad Cohort for Women Workshop, Denver, CO.

Sep 2024
- CMD-IT/ACM Richard Tapia Celebration of Diversity in Computing Conference, to attend the conference in San Diego, CA.

June 2024
- IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), DEI Travel Grant, Seattle, WA.

May 2024
- Women in Computer Vision (WiCV) Workshop, to attend WiCV at CVPR 2024, Seattle, WA.

June 2023
- USDA-ARS AI-COE Fellowship, to attend Graduate Student Internship Program, USDA-ARS, USA.

Apr 2023
- Computing Research Association (CRA-WP), to attend Grad Cohort for Women Workshop, San Francisco, CA.

Other Achievements

Sep 2024
- Selected for the **Doctoral Consortium**, CMD-IT/ACM Richard Tapia Celebration of Diversity in Computing Conference, 2024.
- Selected for a **Poster Presentation**, CMD-IT/ACM Richard Tapia Celebration of Diversity in Computing Conference, 2024.

Jun 2024
- Selected for an **Extended Abstract and Poster Presentation**, Women in Computer Vision (WiCV) Workshop, CVPR 2024.
- Selected for an **Oral Presentation**, Vision for Agriculture (V4A) Workshop, CVPR 2024.

Jan 2023
- Achieved **3rd Place**, AgAthon 2023 (AgAID Digital Hackathon).

Oct 2018
- Achieved **11th Place** (out of 120 teams), National Girls Programming Contest 2018.

Mar 2016
- Achieved **5th Place**, Intra-AUST Programming Contest (Spring 2016).

Services

Professional Services

2024
- **Reviewer**, CVPR Workshop on Vision for Agriculture (V4A).
- **Social Chair**, UVA Computer Science Graduate Student Group (CSGSG) Council.

2022
- **Space and Media Chair**, UVA Computer Science Graduate Student Group (CSGSG) Council.

2020
- **Judge**, Bangladeshi National Robotics Olympiad.

2019
- **Judge**, Bangladeshi National Robotics Olympiad.
- **Program Committee / Sub-Reviewer**, ICIET 2019.

Other Services

2023
- **Student Volunteer**, GEMS (Girls Excited about Math and Science), University of Virginia (non-profit organization). Assisted with course design and teaching sessions for Fall 2023.
- **Volunteer**, Meals on Wheels (non-profit organization). Assisted in meal delivery to the elderly people.

2018
- **Problem Setter**, AUST CSE Preliminary Programming Contest.
- **Organizer and Host**, AUST CSE Week.
- **Host**, AUST CSE Week Prize Giving Ceremony.

2016–2018
- **Class Representative**, Batch 35, AUST CSE Dept. (52 students).

Research Talks and Presentations

Aug 2025
- **Oral and Poster Presentations**, *Knowledge-Informed Deep Learning for Irrigation Type Mapping from Remote Sensing* and *IGraSS: Learning to Identify Infrastructure Networks from Satellite Imagery by Iterative Graph-constrained Semantic Segmentation*, International Joint Conference on Artificial Intelligence (IJCAI 2025).

Sep 2025
- **Presentation (Thesis Summary)**, AgAID Annual Meeting.

Jun 2024
- **Oral and Poster Presentation**, *IrrNet: Advancing Irrigation Mapping with Incremental Patch Size Training on Remote Sensing Imagery*, Vision for Agriculture (V4A) Workshop, CVPR 2024.
- **Poster Presentation**, Women in Computer Vision (WiCV) Workshop, CVPR 2024.

Sep 2024
- **Doctoral Consortium Presentation**, *IrrNet: Spatio-Temporal Segmentation Guided Classification for Irrigation Mapping*, CMD-IT/ACM Richard Tapia Celebration of Diversity in Computing, 2024.
- **Poster Presentation**, *Irrigation Canal Mapping: Constraining the Network Topology and Reachability to Water Sources*, CMD-IT/ACM Richard Tapia Celebration of Diversity in Computing Conference, 2024, San Diego, CA.

Apr 2023
- **Oral and Poster Presentation**, "COVID-19 Non-pharmaceutical Interventions: Data Annotation for Rapidly Changing Local Policy Information," , CCI Symposium 2023.

Dec 2020
- **Presentation**, *Autonomous Deblurring Images and Information Extraction from Documents Using CycleGAN and Mask RCNN*, ICCIT 2020.
- **Presentation**, *BdSL36: A Dataset for Bangladeshi Sign Letters Recognition*, ACCV MLCSA Workshop 2020.

Dec 2018
- **Presentation**, *Real-Time Bangladeshi Sign Language Detection Using Faster R-CNN*, ICIET 2018.