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.,* "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.

2. **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)*, Accepted, 2025.

3. **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: 10.1145/3711896.3737380.

4. **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)*, Accepted, 2025.

5. **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.

6. **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.

7. **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.

8. **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: 10.1038/s41597-023-02482-3.

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: 10.1007/s42979-021-00629-8.

Under Review

1. **O. B. Hoque** *et al.*, "CAFOSat: A Strongly Annotated Dataset for Infrastructure-Aware CAFO Mapping Using High-Resolution Imagery," in *Advances in Neural Information Processing Systems (NeurIPS)*, 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.

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.

Experience (continued)

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

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.

Services (continued)

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.

References

Available on Request