S M Rayeed

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Education

Aug. 2023 – Present	*Doctor of Philosophy in Computer Science, Rensselaer Polytechnic Institute (RPI)* Advisor(s): *Charles V Stewart*, *Yao Ma*	CGPA : **3.96/4.00**
Aug. 2023 – May 2025	*Master of Science in Computer Science, Rensselaer Polytechnic Institute (RPI)* Project: *Fine-Grained Beetle Taxonomy with Vision Models* [*Paper*] | Advisor: *Charles V Stewart*	CGPA : **4.00/4.00**
Jan. 2017 – Mar. 2021	*Bachelor of Science in Computer Science and Engineering, Islamic University of Technology (IUT)*	CGPA : **3.76/4.00**

Research Experience

***Graduate Research Assistant**, Computer Vision Lab, RPI | (Funded by: Imageomics Institute, NSF HDR OAC-2118240)* | Jan. 2024 – Present

- ***Retrieval-Augmented & Knowledge-Based VQA***: Audited and repaired *E-VQA* and *InfoSeek* benchmarks, formalized resolvable insufficiency with partial evidence, quantified the contraindication gap in biomedical text and LLMs. *Currently developing agentic multi-hop KG retrieval.*
- ***Biological VQA:*** Curated *Bio-VQA*, a 1.87M-question benchmark over 216K images, covering taxonomic reasoning, attribute grounding, spatial reasoning and individual re-identification; evaluated 18 VLMs (3.75B–38.4B) against image-blind floors and specialist ceilings.
- ***Fine-Grained Taxonomic Identification:*** Benchmarked 12 vision and vision-language encoders via linear probing on ~100K images of 1,769 carabid species, analyzing multimodal gains, sample-efficient probing, and lab-to-field domain shift; extending to Lepidoptera.
- ***AI-Ready Biodiversity Data:*** Co-led curation of a *continental-scale NEON ground beetle dataset* with validated trait measurements, built an end-to-end detection, segmentation and LLM-verification pipeline to process 65K specimens across 3.6K trays and 518 species.
- ***Animal Re-ID:*** Curated the *Grevy's Zebra Census Dataset*, and helped develop multiview spatio-temporal track clustering for animal re-ID.

***Research Associate**, Systems and Software Lab, IUT | (Funded by: UIU Research Grant UIU-IAR-01-2022-SE-37)* | Apr. 2021 – Jul. 2023

- *Sign Language Recognition:* Curated BdSL47, a depth-based Bangla sign alphabet and digit dataset, using *MediaPipe Hands*.

Publications

[*]Under-review | *[†]First-author*

Conference and Journal Papers

WACV 2027	*[†]BioVQA: A Benchmark for Biological Question Answering across Taxonomic, Fine-grained and Spatial Reasoning* [link]
ECCV 2026	*Identifying and Resolving Pitfalls of Knowledge-Based VQA Benchmarks: Auditing, Repairing, and Augmenting* [link]
Nature/S-Data 2026	*[†]A continental-scale dataset of beetles with high-resolution images and validated morphological trait measurements* [link]
MEE 2026	*[*]From collection trays to AI-ready data: An operational framework for automated entomological specimen processing* [link]
MEE 2025	*Optimizing Image Capture for CV-Powered Taxonomic Identification and Trait Recognition of Biodiversity Specimens* [link]
Data in Brief 2023	*[†]BdSL47: A complete open-access depth-based Bangla sign alphabet and digit dataset* [link]
ICMV 2022	*[†]Bangla sign digits recognition using depth information* [link]

Workshop Papers

AAAI 2027	*[*†]Close Enough to Guess: Resolvable Insufficiency in Retrieval-Augmented Question Answering* [Workshop: NeuSymBridge]
AAAI 2027	*[*†]Silent on Harm: The Contraindication Gap in Biomedical Text and Language Models* [Workshop: W3PHIAI]
NeurIPS 2025	*BeetleFlow: An Integrative Deep Learning Pipeline for Beetle Image Processing* [link] [Workshop: Imageomics]
NeurIPS 2025	*Mind the (Data) Gap: Evaluating Vision Systems in Small Data Applications* [link] [Workshop: Imageomics]
ICCV 2025	*[†]Fine-Grained Taxonomy with Vision Models* [link] [Workshop: Computer Vision for Ecology]
CVPR 2025	*[†]BeetleVerse: A study on taxonomic classification of ground beetles* [link] [Poster] [Workshop: CV4Animals]
CVPR 2025	*Animal Re-Identification via Multiview Spatio-Temporal Track Clustering* [link] [Workshop: CV4Animals]

Selected Projects

more projects are available on: github.com/SMRayeed

Oct. 2023 – Dec. 2023	***Integrating Tree Ring and Weather Data for Combating Illegal Logging:*** To predict the location of a lumber from its ring variation over the years integrated with weather data	*Link*

Oct. 2023 – Nov. 2023	***Neural Network-based Risk Analysis and Prediction for Short Selling using Financial Market Indicators***	*Link*
Oct. 2023 – Nov. 2023	***Analyzing Camera Trap Images using Deep Learning*** *(PyTorch, EfficientNet, Megadetector)*	*Link*
Aug. 2020 – Sep. 2020	***Brain Tumor Detection using CNN MRI images*** *(Keras, TensorFlow)*	*Link*

Technical Skills

VLMs: *Qwen3-VL, InternVL3.5, Gemma 3/4, LLaVA-NeXT, Llama 3.2 Vision, Pixtral, Molmo2, Phi-4-multimodal, Florence-2, BLIP-2*
Vision & Multimodal Encoders: *CLIP, SigLIP, EVA-CLIP, BioCLIP, BioCLIP-2, DINOv2, DINOv3, ViT, ConvNeXt, Swin V2, EfficientNet, ResNet*
Retrieval & VQA: *Multimodal RAG, Dense Retrieval, Re-ranking, Knowledge-based VQA, Knowledge Graph QA, Multi-hop QA*
Evaluation: *Zero-/Few-shot Evaluation, Linear Probing, Taxonomic-Distance (LCA) Metrics, Signal Detection Theory, Human Validation Protocols*
Detection & Segmentation: *Grounding DINO, YOLOv8–v10, SAM, SAM2, MegaDetector, Detectron2, Moondream*
HPC & Inference: *HF Transformers, FlashAttention, FP8 Quantization, SLURM Array Pipelines, Multi-GPU A100/H100 Clusters, CUDA, MPI*
Programming, ML & Data Tools: *Python, SQL, PyTorch, TensorFlow, Keras, scikit-learn, NumPy, Pandas, Matplotlib, Seaborn, OpenCV*

Workshops & Events

organized by Imageomics Institute, The Ohio State University

1. FuncaPalooza 2025 (Aug. 2025)
2. Wild Data: AI for Ecology (Apr. 2025)
3. All-Hands Meeting (Apr. 2025)
4. BeetlePalooza 2024 (Aug. 2024)

Teaching Experience

as Graduate Teaching Assistant *at Rensselaer Polytechnic Institute*

Aug. 2024 – Dec. 2024	***CSCI 4965/6965 AI for Conservation*** *– Instructor: Charles V Stewart (Email)* – Fall 2024
Aug. 2023 – Dec. 2024	***CSCI 1100 Computer Science I*** [*Website*] *– Instructor: Uzma Mushtaque (Email)* – Fall 2023, Summer 2024, Fall 2024

Industrial Experience

At Nilavo Technologies Ltd., Dhaka, Bangladesh (An offshore facility of Biscom Inc, Westford, MA, US)

Jan. 2023 – Jul. 2023	***Software Quality Assurance Engineer*** – Automation using Playwright, Cypress | Project Management
Mar. 2021 – Dec. 2022	***Junior Test Engineer*** – Automation using Cypress, Selenium | API Testing | Security Testing using BurpSuite

Standardized Test Scores

Sept. 2022	***GRE : 332 out of 340***	Verbal : 162/170 | Quant : 170/170 | AWA : 4.0/6.0
Nov. 2021	***IELTS : 8.0 out of 9.0***	Listening : 8.5 | Reading : 8.5 | Writing : 7.5 | Speaking : 7.0

Professional Service

1. Conferences: Reviewer, KDD: AI for Science Track, 2027 (Cycle 1), 2026 (Cycle 2) | Sub-Reviewer: WACV 2027, ECCV 2026
2. Workshops: Reviewer, CVPR Workshop: CV4Animals 2026, 2025 | NeurIPS Workshop: Imageomics 2025
3. Journals: Reviewer, Communications Earth & Environment (Nature Portfolio) 2026 | Reviewer, PLOS ONE 2026
4. Student Organizer, Scientific Modeling Out-of-Distribution ML Challenge (Year 2: 2026) – by Imageomics, A3D3, iHarp

References

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