

Toqi Tahamid Sarker

toqitahamid.sarker@siu.edu | linkedin.com/in/toqi | github.com/toqitahamid | Google Scholar | toqitahamid.com

EDUCATION

Southern Illinois University Carbondale Ph.D. Candidate, Computer Science	Carbondale, IL, USA Aug. 2023 – July 2027 (expected)
• Advisor: Dr. Khaled R. Ahmed.	
BRAC University B.Sc., Computer Science and Engineering	Dhaka, Bangladesh Sep. 2012 – Dec. 2017

RESEARCH EXPERIENCE

Graduate Research Assistant BASE Lab, Southern Illinois University Carbondale. Advisor: Dr. Khaled R. Ahmed	Aug. 2023 – Present Carbondale, IL, USA
• Built grounded vision-language models that segment gas plumes and report their concentrations, beating models up to 8B parameters on plume IoU with a 700M-parameter model.	
• Developed monocular metric distance estimation by conditioning Depth Anything V2 on a reference distance map, with calibrated intervals covering 95% of distances on trail cameras never seen in training.	
• Designed efficient vision transformers for real-time detection, segmentation, and multi-task learning on thermal, RGB, and drone imagery, down to 3.3M parameters at 115 FPS.	
• Built 10 computer vision datasets with 300,000+ annotated frames across livestock emissions, weeds, wildlife, and food safety, working with collaborators in animal science, plant and soil science, and wildlife ecology.	
• Co-wrote two external proposals with Dr. Khaled R. Ahmed in 2024, to the Bezos Earth Fund and USDA, on multimodal AI for quantifying livestock methane emissions.	
Graduate Research Assistant Panacea Lab, Georgia State University. Advisor: Dr. Juan M. Banda	Aug. 2018 – Aug. 2019 Atlanta, GA, USA
• Trained the first deep learning tracker for solar events, following Active Regions and Coronal Holes between labels that arrive only every 4 to 12 hours.	
• Built its dataset by downloading 500,000+ extreme ultraviolet images from NASA’s Solar Dynamics Observatory and converting event coordinates into pixel bounding boxes.	

INDUSTRY EXPERIENCE

Co-Founder and Software Engineer Penguin Ecommerce	Dec. 2017 – Apr. 2022 Dhaka, Bangladesh
• Designed and built the backend of an electronics e-commerce platform in Go and PostgreSQL, with REST APIs for inventory, orders, payments, and refunds.	
• Built internal dashboards in React/Next.js and custom storefront features on WooCommerce, and maintained the platform from launch to 2022.	

PUBLICATIONS

13 conference papers, 4 journal articles, and 2 papers under review. 8 first-author papers (7 published, 1 under review) and 3 co-first-author papers. Full list on [Google Scholar](#). * denotes equal contribution.

UNDER REVIEW

[U1] T. T. Sarker, T. Islam, M. G. Embaby, G. C. Handlos, A. AbuGhazaleh, and K. R. Ahmed. GasVLM: Grounded Vision-Language Quantification of Methane and Carbon Dioxide in Optical Gas Imaging for Livestock Emission Monitoring. *Under review at a journal*, 2026.

[U2] T. Islam, T. T. Sarker, S. J. Morelock, G. Bastille-Rousseau, and K. R. Ahmed. Automated Counting of White-Tailed Deer in Vehicle-Mounted Thermal Video: Detector Benchmarking and a Staged Error Decomposition. *Under review at a journal*, 2026.

CONFERENCE PAPERS

- [C1] T. T. Sarker, T. Islam, S. J. Morelock, G. Bastille-Rousseau, and K. R. Ahmed. Reference-Conditioned Distance Intervals on Unseen Camera Traps. *European Conference on Computer Vision (ECCV) Workshops, Computer Vision for Ecology*, 2026. [\[paper\]](#) [\[code\]](#)
- [C2] T. T. Sarker, T. Islam, A. Lakhssassi, C. B. Rankrape, K. E. Creager, K. Gage, and K. R. Ahmed. WeedRepFormer: Reparameterizable Vision Transformers for Real-Time Waterhemp Segmentation and Gender Classification. *International Conference on Pattern Recognition (ICPR) Workshops, Computer Vision for Biodiversity Monitoring and Conservation*, 2026. [\[paper\]](#) [\[code\]](#)
- [C3] K. R. Ahmed, T. T. Sarker, T. Islam, T. M. Alanezi, and A. AbuGhazaleh. FryNet: Dual-Stream Adversarial Fusion for Non-Destructive Frying Oil Oxidation Assessment. *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, VISION*, 2026. [\[Oral\]](#) [\[paper\]](#)
- [C4] T. Islam, A. Lakhssassi, T. T. Sarker, M. G. Embaby, K. R. Ahmed, and A. AbuGhazaleh. TRACE: Thermal Recognition Attentive-Framework for CO₂ Emissions from Livestock. *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, Vision for Agriculture*, 2026. [\[paper\]](#)
- [C5] T. Islam, T. T. Sarker, M. G. Embaby, K. R. Ahmed, and A. AbuGhazaleh. FUME: Fused Unified Multi-Gas Emission Network for Livestock Rumen Acidosis Detection. *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) Workshops, HARVEST-Vision*, 2026. [\[Oral\]](#) [\[paper\]](#)
- [C6] T. T. Sarker, M. G. Embaby, T. Islam, A. AbuGhazaleh, and K. R. Ahmed. GasTwinFormer: A Hybrid Vision Transformer for Livestock Methane Emission Segmentation and Dietary Classification in Optical Gas Imaging. *IEEE/CVF International Conference on Computer Vision (ICCV) Workshops, Sustainability with Earth Observation and AI*, 2025. [\[Oral\]](#), [8.57% acceptance rate](#) [\[Best Paper Nominee\]](#) [\[paper\]](#) [\[code\]](#)
- [C7] T. T. Sarker, K. R. Ahmed, T. Islam, C. B. Rankrape, and K. Gage. WeedSense: Multi-Task Learning for Weed Segmentation, Height Estimation, and Growth Stage Classification. *IEEE/CVF International Conference on Computer Vision (ICCV) Workshops, Computer Vision in Plant Phenotyping and Agriculture*, 2025. [\[Oral\]](#) [\[paper\]](#) [\[code\]](#)
- [C8] T. Islam, T. T. Sarker, M. G. Embaby, K. R. Ahmed, and A. AbuGhazaleh. CarboFormer: A Lightweight Semantic Segmentation Architecture for Efficient Carbon Dioxide Detection Using Optical Gas Imaging. *International Symposium on Visual Computing (ISVC)*, 2025, pp. 3–15. [\[Oral\]](#) [\[paper\]](#)
- [C9] A. Lakhssassi*, T. T. Sarker*, K. R. Ahmed, N. Lakhssassi, and K. Meksem. SoyStageNet: Balancing Accuracy and Efficiency for Real-Time Soybean Growth Stage Detection. *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, Vision for Agriculture*, 2025, pp. 5524–5533. [\[paper\]](#)
- [C10] T. Islam, T. T. Sarker, K. R. Ahmed, C. B. Rankrape, and K. Gage. WeedVision: Multi-Stage Growth and Classification of Weeds Using DETR and RetinaNet for Precision Agriculture. *IEEE International Conference on Machine Learning and Applications (ICMLA)*, 2024, pp. 1374–1381. [\[paper\]](#)
- [C11] T. T. Sarker, M. G. Embaby, K. R. Ahmed, and A. AbuGhazaleh. Gasformer: A Transformer-based Architecture for Segmenting Methane Emissions from Livestock in Optical Gas Imaging. *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, Vision for Agriculture*, 2024, pp. 5489–5497. [\[Oral\]](#) [\[paper\]](#) [\[code\]](#)
- [C12] T. T. Sarker, T. Islam, and K. R. Ahmed. Cannabis Seed Variant Detection Using Faster R-CNN. *International Conference on Advanced Computing and Communication Systems (ICACCS)*, 2024, pp. 1403–1408. [\[paper\]](#)
- [C13] T. T. Sarker and J. M. Banda. Solar Event Tracking with Deep Regression Networks: A Proof of Concept Evaluation. *IEEE International Conference on Big Data*, 2019, pp. 4942–4949. [\[paper\]](#) [\[code\]](#)

JOURNAL ARTICLES

- [J1] T. Islam, T. T. Sarker, M. G. Embaby, K. R. Ahmed, and A. AbuGhazaleh. VLMDual: A Vision-Language Distillation Framework for Joint Classification and Plume Segmentation in Rumen Acidosis Detection. *Smart Agricultural Technology*, 102358, 2026. [\[paper\]](#)
- [J2] T. Islam, T. T. Sarker, K. R. Ahmed, C. B. Rankrape, and K. Gage. WeedSwin Hierarchical Vision Transformer with SAM-2 for Multi-Stage Weed Detection and Classification. *Scientific Reports*, vol. 15, 23274, 2025. [\[paper\]](#)
- [J3] M. G. Embaby*, T. T. Sarker*, A. AbuGhazaleh, and K. R. Ahmed. Optical Gas Imaging and Deep Learning for Quantifying Enteric Methane Emissions from Rumen Fermentation In Vitro. *IET Image Processing*, vol. 19, no. 1, e13327, 2025. [\[paper\]](#)
- [J4] T. Islam*, T. T. Sarker*, K. R. Ahmed, and N. Lakhssassi. Detection and Classification of Cannabis Seeds Using RetinaNet and Faster R-CNN. *Seeds*, vol. 3, no. 3, pp. 456–478, 2024. [\[paper\]](#)

HONORS AND AWARDS

- **Dissertation Research Assistantship**, Southern Illinois University Carbondale 2026 – 2027
- **Doctoral Research Fellowship**, Southern Illinois University Carbondale 2025 – 2026
- **Best Paper Nominee**, ICCV 2025 Workshop on Sustainability with Earth Observation and AI 2025
- **Travel Grant**, ICCV 2025 Broadening Participation Program 2025
- **Travel and Conference Award**, Graduate and Professional Student Council, SIU Carbondale 2025
- **Graduate Student Professional Development Monetary Support**, Graduate School, SIU Carbondale 2025
- **Vice Chancellor for Research Fellowship**, Southern Illinois University Carbondale 2023 – 2025
- **Travel Grant**, CVPR 2024 Diversity, Equity, and Inclusion Program 2024
- **Top 17%**, The Nature Conservancy Fisheries Monitoring competition, Kaggle 2017

CONFERENCE PRESENTATIONS

Presentations given in person at peer-reviewed workshops.

Sustainability with Earth Observation and AI Workshop, ICCV 2025 Honolulu, HI
GasTwinFormer. Oral and poster, Best Paper Nominee. 2025

Computer Vision in Plant Phenotyping and Agriculture Workshop, ICCV 2025 Honolulu, HI
WeedSense. Oral and poster. 2025

Vision for Agriculture Workshop, CVPR 2024 Seattle, WA
Gasformer. Oral and poster. 2024

MEDIA COVERAGE

Featured and quoted on camera-trap distance estimation research, [SIU News](#) Oct 2026

Camera-trap distance estimation software featured on [KFVS12 Heartland News](#) (TV) Oct 2026

TEACHING EXPERIENCE

TEACHING ASSISTANT

Graduate Teaching Assistant, CS 591-951: Deep Learning for Computer Vision Summer 2026
Southern Illinois University Carbondale Carbondale, IL, USA

- Instructor: Dr. Khaled R. Ahmed.
- Built the course's [Study Assistant](#), a retrieval-augmented study tool with citation-backed answers, auto-generated quizzes, and audio review episodes for the 17-student cohort.

Graduate Teaching Assistant, CSC 1010: Computers and Applications Summer 2019
Georgia State University Atlanta, GA, USA

- Instructor: Dr. Jaman Bhola.

Graduate Teaching Assistant, CSC 4980/6980: Blockchain and Applications Spring 2019
Georgia State University Atlanta, GA, USA

- Instructor: Dr. Juan M. Banda.

WORKSHOP INSTRUCTOR

Co-organizer and Instructor 2024 – 2025
Artificial Intelligence in Animal Science Workshop, with M. G. Embaby, Department of Animal Science Carbondale, IL, USA

- Under the USDA National Institute of Food and Agriculture project Artificial Intelligence for Greener Livestock.
- Apr. 16, 2025: graduate and undergraduate students of the Department of Animal Science.
- Nov. 21, 2024: animal science students in UNIV 101 Saluki Success, the first-year university seminar.

MENTORING

Research Mentor to Master's Students 2023 – Present
BASE Lab, Southern Illinois University Carbondale. With Dr. Khaled R. Ahmed Carbondale, IL, USA

- **James Antwi Adinkrah**, M.S. thesis: Report-Guided Pseudo-Label Generation and Transformation-Based Detection for Chest X-ray Pathology Localization without Manual Annotation. Defended March 2026.
- **Nishanth Sagar Panthangi**, M.S. thesis: Federated Learning for Portfolio Optimization, 2024. Now Software Development Engineer II at Amazon.
- **Aluri Manoj**, M.S. thesis: Porosity Prediction and Estimation in Metal Additive Manufactured Parts Using Deep Learning, 2024.

DATASETS AND SOFTWARE

DATASETS

- **Camera-trap distance benchmark** (2026): 122 calibration photos with 4,395 ground-contact markers from 62 trail cameras at two Illinois forest sites. With the Center for Wildlife Sustainability Research, SIU Carbondale.
- **Optical gas imaging (OGI) datasets for livestock emissions** (2024 – 2026): nine datasets, 109,000+ mask-annotated thermal frames, collected with the School of Agricultural Sciences, SIU Carbondale.
 - **GasGround** (2026): 42,757 frames with per-frame CH₄ and CO₂ concentrations, the first livestock OGI benchmark that ties a gas concentration to every plume mask.
 - **Beef cattle methane** (2025): 11,694 frames from 12 cows under three diets.
 - **Controlled Diet** (2025): 4,885 frames at three verified concentrations.
 - Six smaller datasets: controlled methane release and dairy rumen gas (2024), plus controlled CO₂ release, rumen fluid, dual-gas CH₄/CO₂, and farm CO₂ (2025 – 2026, data collection).
- **FryNet** (2026): 7,226 paired RGB and thermal frames from 28 frying videos with oil chemistry labels.
- **Weed datasets** (2025 – 2026): 210,000+ labeled images, including the **Weed Growth Stage Dataset** of 16 species over 11 weeks, **WeedSense** with masks, plant height, and growth stage, and a 10,264-frame waterhemp sex dataset.

SOFTWARE

- **CamTrap Measure** (2026): desktop app that measures the distance to each deer in camera-trap photos with MegaDetector, SpeciesNet, and the reference-conditioned distance network. Built for the Center for Wildlife Sustainability Research, SIU Carbondale.
- **Annotation tools** (2026): **FlagLabel** for camera-trap calibration flags, **HutLabel** for muskrat huts on drone orthomosaics, and **SegLabel** for gas plume masks, used to label GasGround.

SERVICE

CONFERENCE REVIEWER		JOURNAL REVIEWER	
NeurIPS	2026	Sensors	2026
ECCV Workshops	2026	Infrared Physics and Technology	2026
CVPR Workshops	2026, 2025, 2024	Applied Computational Intelligence and Soft Computing	2026
ICCV Workshops	2025	Frontiers in Physics	2025

LEADERSHIP AND VOLUNTEERING

STEM Outreach Volunteer, American Mathematics Olympiad, Southern Illinois University	Oct. 2026
Engagement Secretary, Bangladesh Student Association, SIU Carbondale	2026 – Present
Volunteer, HackGSU Fall 2018 hackathon, Georgia State University	2018
Peer Mentor, First Year Advising Team, BRAC University	2013

TECHNICAL SKILLS

- Frameworks: PyTorch, MMSegmentation, MMDetection, OpenCV, vLLM, React/Next.js.
- Programming: Python, Go, TypeScript, Java, SQL, $\LaTeX$.