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Ph.D. Candidate in Computer Science
University of Rhode Island

	University of Rhode Island, Kingston, RI
Expected Aug/Sept. 2026	Ph.D. in Computer Science
	Bridgewater State University, Bridgewater, MA
May 2021	M.S. in Computer Science
May 2019	B.S. in Computer Science with Departmental Honors; Minor: Mathematics

Selected Research Projects

2025 – Present

SPOT: Spatially Preserving Object Detection with Transformers
I have developed a compact, DETR-style model called SPOT for GeoAI and spatial sensing frameworks where detections need to be fast, localized, and geometrically reliable. I focus on preserving weak but meaningful object features before decoder refinement, improving boundary placement, separating adjacent instances, and evaluating the model across COCO, VisDrone, and road-sidewalk transfer settings.

2025 – Present

SPOT2Go: Robotic GeoAI for Real-Time Obstacle Detection Along Pedestrian Routes
As a proof of concept, I have built a system called SPOT2Go as the deployment side of this research, bringing SPOT onto a Unitree Go2 Pro quadruped robot equipped with RGB-Depth sensing, 360-degree LiDAR, and NVIDIA Jetson (Orin Nano) edge computing. I integrate object detection, depth-based distance estimates, ROS messaging, indoor SLAM, outdoor map context, detection logs, and spoken alerts to enable users to monitor obstacles that block or narrow pedestrian routes in real-time.

2025 – Present

How Hungry is AI? Hardware-Aware LLM Inference and Sustainable AI
I contributed to a project that benchmarks the energy, water, and carbon footprint of LLM inference across commercial deployment settings. I work at the intersection of LLMs, hardware architecture, and AI systems by examining how prompt length, batching, GPU utilization, hardware class, datacenter overhead, and deployment context shape latency, throughput, cost, and environmental impact. Beyond the paper accepted by Communications of the ACM (CACM), I have been extending this work through hands-on open-source model calibration using serving and local deployment tools such as vLLM, llama.cpp, Ollama, and SGLang, which helps me explain LLMs as infrastructure systems rather than black-box APIs. This work helps me teach AI not only as a model or API but also as an infrastructure system with real costs, trade-offs, and organizational consequences.

2024 – 2025

CLARA: Context-aware RAG-LLM Framework for Mobile Sensor Anomaly Detection
I developed CLARA to make anomaly detection in mobile device sensor streams more interpretable and actionable. I used the ExtraSensory dataset, FAISS vector retrieval, sensor-pattern embeddings, missing-data handling, and an LLM-based reasoning layer to retrieve historical context and explain anomalies for health and lifestyle monitoring and technical quality-control scenarios. This project strengthened my ability to connect RAG systems, sensor analytics, and responsible AI through examples that students can build and critique.

2024 – 2025

BirdCV-LiDAR: Multimodal Data Fusion for Automated Sidewalk Infrastructure Assessment
I developed BirdCV-LiDAR to make sidewalk accessibility assessment scalable beyond the limitations of slow, manual field surveys. I fuse drone imagery, SRT flight metadata, and aerial LiDAR point clouds (ALPC) so YOLO-OBB detections of crosswalks and truncated domes can be converted into real-world slope and dimension checks for ADA-PROWAG compliance.

2023 – 2024 **CrackLens: Automated Sidewalk Crack Detection and Segmentation**
I developed CrackLens after seeing that overgrown sidewalks can confuse conventional crack detectors and make manual annotation inconsistent. I used RGB-depth fusion data from an Intel RealSense camera, DoT crack definitions, HSV filtering, automated labeling, and a transformer-based segmentation model to detect sidewalk cracks on rough, noisy surfaces.

2023 – 2024 **Chicago Array of Things IoT Anomaly Detection**
I analyzed Chicago Array of Things records to test whether large, unlabeled urban sensor datasets can support anomaly detection without hand labeling every reading. I focused on sensor-level clustering with K-Means, DBSCAN, and HDBSCAN, then compared the clustered temperature behavior with NOAA weather data to identify potentially faulty or unusual readings.

2020 – 2021 **Profanity Detector through Natural Language Processing**
I completed this as my M.S. thesis to understand how an end-to-end NLP system can collect, clean, analyze, and moderate informal online language. I built components for Reddit text processing, tokenization, exploratory analysis, profanity detection, censorship, and n-gram language modeling, while accounting for practical edge cases such as whole-word matching, capitalization, and multiword terms.

2018 – 2019 **Cyberattack Trend Analysis through Data Mining**
I completed this undergraduate honors thesis to understand how categories of cyberattacks changed across real breach reports from 2016 to 2018. I wrangled incident data in R, resolved inconsistent fields, visualized threat patterns, and connected frequent attacks such as DDoS, SQL injection, malware, account hijacking, and targeted attacks to practical countermeasures. This work has been presented at the Massachusetts Undergraduate Research Conference (MassURC) and the National Conference on Undergraduate Research (NCUR).

Teaching and Mentoring Experience

Summers 2022, 2023 **Part-Time Instructor, Survey of Computer Science (CSC 110), University of Rhode Island**
I taught Survey of Computer Science to beginning students from various majors who often arrived with varying levels of confidence and prior exposure to computing. I focused on making abstract ideas more approachable through clear examples, structured practice, and patient troubleshooting, so students could see computing as a problem-solving tool rather than just syntax.

2021-2022, 2025-2026 **Graduate Teaching Assistant, University of Rhode Island**
I supported undergraduate computing students through office hours, grading, and one-on-one help with programming and core computing concepts. I used those meetings to diagnose where students were getting stuck, explain ideas in multiple ways, and help them build habits for debugging and independent learning.

Jan. 2019 – May 2019 **Math Service Head Tutor, Bridgewater State University**
I managed tutor appointments while also tutoring students across business/economics calculus, advanced mathematics, and real analysis. This role taught me to identify conceptual gaps quickly, scaffold complicated material, and mentor students in a way that balanced rigor with encouragement.

Sept. 2016 – Dec. 2018 **Math Teaching Assistant, Precalculus, Bridgewater State University**
I assisted students taking Precalculus during work hours and taught a designated weekly class session. Having worked through my own transition into STEM, I translated procedures into step-by-step reasoning, created approachable explanations of algebraic and trigonometric concepts, and helped students prepare for assignments and exams.

Summer 2018 **Statistics Tutor and Math Readiness Boot Camp Tutor, Bridgewater State University**
I facilitated one-on-one, statistics- and readiness-focused mathematics for students in mathematics, business, economics, and psychology. I adapted examples to each student's field

and comfort level, with the goal of reducing math anxiety and building confidence before students moved into more demanding coursework.

Selected Publications

1. Jegham, N.; Abdelatti, M.; **Koh, C. Y.**; Elmoubarki, L.; Hendawi, A. "How Hungry is AI? Benchmarking Energy, Water, and Carbon Footprint of LLM Inference." Communications of the ACM (CACM), accepted for publication, CACM–25–11–5620.R2, 2025.

2. KafiKang, M.; Abeysiriwardana, C.; Singh, V. K.; **Koh, C. Y.**; Prichard, J.; Mor, S. K.; Hendawi, A. "Analysis of Emerging Variants of Turkey Reovirus using Machine Learning." Briefings in Bioinformatics, 25(3), bbae224, 2024.

3. DeMedeiros, K.; **Koh, C. Y.**; Hendawi, A. "Clustering on the Chicago Array of Things: Spotting Anomalies in the Internet of Things Records." Future Internet, 16(1), 28, 2024.

4. **Koh, C. Y.;** DeMedeiros, K.; Hendawi, A. "CLARA: Context-aware RAG-LLM Framework for Anomaly Detection in Mobile Device Sensors." In 2025 26th IEEE International Conference on Mobile Data Management (MDM), pp. 1-8. IEEE, 2025.

5. **Koh, C. Y.**; Hendawi, A. "Towards Disability-Aware Sidewalk Routing." In Proceedings of the 31st ACM International Conference on Advances in Geographic Information Systems (pp. 1-2), 2023.

6. **Koh, C. Y.**; Abdelatti, M.; Hendawi, A. "BirdCV-LiDAR: A Multimodal Data Fusion Framework for Automated Sidewalk Infrastructure Assessment." ISPRS Annals, XI–4–2026, 303–312, 2026.

7. Jegham, N.; **Koh, C. Y**.; Abdelatti, M.; Hendawi, A. "YOLO Evolution: A Comprehensive Benchmark and Architectural Review of YOLOv12, YOLO11, and Their Previous Versions." arXiv:2411.00201v4, 2025.

8. **Koh, C. Y.**; Ali, M.; Hendawi, A. "CrackLens: Automated Sidewalk Crack Detection and Segmentation." IEEE Transactions on Artificial Intelligence, 5(11), pp.5418-5430, 2024.

9. **Koh, C. Y.**; Hendawi, A. "SPOT: Spatially Preserving Object Detection with Transformers." Submitted to ACM SIGSPATIAL Research Track, 2026.

10. **Koh, C. Y.**; Hendawi, A. "SPOT2Go: Robotic GeoAI for Real-Time Obstacle Detection Along Pedestrian Routes." Submitted to ACM SIGSPATIAL Demo Track, 2026.

11. **Koh, C. Y.** "Analyzing and Estimating Cyberattack Trends by Performing Data Mining on a Cybersecurity Data Set." Undergraduate Honors Thesis, Bridgewater State University, 2019.