SANJOY KUNDU

362 West Glenn Avenue, Auburn, Alabama, AL 36830
szk0266@auburn.edu sanjoykundu.ece@gmail.com https://sanjoykundu.github.io/
405-762-5196

RESEARCH INTERESTS

- Applied AI in medical imaging, remote sensing, and plant and animal pathology
- Graph based representation of visual world (images, videos)
- Multi-modal view-invariant learning for Ego-centric videos, multi-modal learning (text and image, text and video/audio), Generative models, Foundation models
- Open-world scene and video understanding

TEACHING INTERESTS

Undergraduate	◇ Discrete Mathematics, Theoretical Foundations of Computing, Introduction to Programming Languages, Data Structure and Algorithms, Machine Learning, Artificial Intelligence
Graduate	◇ Machine Learning, Artificial Intelligence, Deep Learning, Computer Vision

EDUCATION

August 1 2025	◇ Anticipated Date of Graduation
Fall 2023 – current	◇ **Ph.D., Auburn University, Auburn, Alabama** in Computer Science and Software Engineering **(Transferred from OSU)**
Spr 20 – Sum 23	◇ **Ph.D., Oklahoma State University, Stillwater, Oklahoma** in Computer Science **(Transferred to AU)**
2016 – 2019	◇ **M.S., Stamford University, Bangladesh** in Computer Science and Engineering
2009 – 2013	◇ **B.S., Khulna University of Engineering and Technology** in Electronics and Communication Engineering

RESEARCH EXPERIENCES

Fall 2024 – current	◇ Graduate Research Assistant, Dept. of Computer Science and Software Engineering, Auburn University, Auburn, Alabama
Summer 2024	◇ Research Intern, Department of Machine Learning, NEC Labs America Inc.
Fall 2023 - Spring 2024	◇ Graduate Research Assistant, Dept. of Computer Science and Software Engineering, Auburn University, Auburn, Alabama
Spring 2020- Spring 2023	◇ Graduate Research Assistant, Dept. of Computer Science, Oklahoma State University

RESEARCH PROJECTS

Bio-medical Object Detection:	We created a dataset and evaluation platform for object detection for canine cutaneous mast cell tumors, especially in situations where resources are limited.	2020
Open-World Action:	Open-world action recognition in ego-centric videos using energy based pattern theory framework	2021
Scene Understanding :	Generated the spatial graphs of static scenes using graph generative approach, where we first generated the structures of the graphs and then labeled the edges	2022
Open-World Action with Visual Grounding:	We used a VLM and common sense reasoning to ground objects in ego-centric videos and inferred actions using the energy-based pattern theory framework in ego-centric videos	2023
View-invariant Ego-Centric Representation :	Working on a project to learn view-invariant representation of ego-centric videos for procedure understanding in long procedural videos	2024

TEACHING EXPERIENCE

Guest Lecturer	Generative AI: Diffusion Models in Artificial Intelligence	Auburn University Fall 2024
	Linear Regression, Logistic Regression in Artificial Intelligence	Auburn University Spring 2024
	Graph Neural Network in Artificial Intelligence	Auburn University Fall 2023
	Graph Neural Network, implementing GNN in pytorch in Machine Learning	Oklahoma State University Fall 2021
Graduate Teaching Assistant	Artificial Intelligence	Auburn University Fall 2023, 2024, Spring 2024
	Operating Systems (Graduate)	Oklahoma State University Spring 2023
	Computer Organization and Architecture (Graduate)	Oklahoma State University Spring 2022
	Machine Learning	Oklahoma State University Fall 2021, 2022
	Operating Systems (Undergraduate)	Oklahoma State University Spring 2021
	Computer Programming, Unix Programming	Oklahoma State University Spring 2020
	Data Structures and Algorithms (Undergraduate)	Oklahoma State University Fall 2020

RESEARCH PUBLICATIONS

JOURNAL PAPERS

1. Z. Chen, S. Kundu, H. S. Baweja, and S. N. Aakur, "EASE: Embodied Active Event Perception via Self-Supervised Free Energy Minimization," *IEEE Robotics Automation Letters*, 2025.

2. S. N. Aakur, S. Kundu, and N. Gunti, "Knowledge Guided Learning: Open World Egocentric Action Recognition with Zero Supervision," *Pattern Recognition Letter*, vol. 156, 38-45, 2022.

CONFERENCE PAPERS

1. S. Kundu, S. Vellamcheti, and S. N. Aakur, "ProbRes: Probabilistic Jump Diffusion for Open-World Egocentric Activity Recognition," in *Accepted at ICCV 2025*, 2025.
2. S. Vellamcheti, S. Kundu, and S. N. Aakur, "Hallucinate, Ground, Repeat: A Framework for Generalized Visual Relationship Detection," in *In Review*, 2025.
3. R. Xian, I. Melvin, D. A. Patel, S. Kundu, M. R. Min, and D. Manocha, "CALIBFREE: Self-Supervised Feature Disentanglement for Calibration-free Multi-Camera Multi-Object Tracking," in *In Review*, 2025.
4. S. Kundu, S. Trehan, and S. N. Aakur, "Discovering Novel Actions from Open World Egocentric Videos with Object-Grounded Visual Commonsense Reasoning," in *European Conference on Computer Vision, (ECCV)*, Springer, 2024, pp. 39–56.
5. S. Kundu and S. N. Aakur, "IS-GGT : Iterative Scene Graph Generation With Generative Transformers," in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2023*, vol. pp. 6292-6301, 2023.
6. S. Kundu, N. Gunti, B. Hendrickson, M. S, and S. Aakur, "Benchmark and Evaluation of Low Resource Object Detection in Biomedical Images," in *Proceeding of the IEEE Applied Imagery Pattern Recognition Workshop (AIPR)*, 2020.
7. A. Mallik and S. Kundu, "Design of a Novel Dual-Band Microstrip Patch Antenna Operating at 2.45 Ghz and 2.84 Ghz with Practical Implementation," in *Proceedings of the IEEE Int'l Conf. Computer and Information Technology*, 2014, pp. 40–45.
8. A. Mallik, S. Kundu, and M. O. Goni, "Gain and SAR Improvement of a Conventional Patch Antenna Using a Novel Pi-shaped DNG Metamaterial," in *Proceedings of the IEEE International Conference on Electrical Information and Communication Technology (EICT)*, 2014.
9. A. Mallik, S. Kundu, and M. O. Goni, "Design of a Novel Two-Rectangular u-shaped Double Negative Metamaterial," in *Proceedings of the IEEE International Conference on Informatics, Electronics and Vision (ICIEV)*, 2013, pp. 1–6.
10. A. Mallik, S. Kundu, and M. A. Rahman, "An Fpga-Based Semi-Automated Traffic Control System Using Verilog HDL," in *Proceeding of the International Conference on Electrical, Computer and Telecommunication Engineering (ICECTE2012)*, 2012.

INDUSTRY EXPERIENCE

Summer 2024 ◇ **Machine Learning Intern, NEC Laboratory America Inc, Princeton, New Jersey**
Worked on representation learning of multi-view ego-exo videos for procedure understanding in egocentric videos

Nov 2016-Dec 2019 ◇ **Network Engineer, Network Operation Center, Fiber@Home, Bangladesh**
Worked as an engineer in the network operation center of a nation wide fiber-optic telecommunication network

INDUSTRY EXPERIENCE (continued)

Apr 2015- Jul 2015 ◇ **Telecom Engineer, Enroute Int'l, Bangladesh**
Worked as a telecommunication engineer for local telecommunication operator

SKILLS

Coding ◇ **Python** (Advanced), C (Intermediate), Java (Intermediate)

ML/DL tools ◇ **Pytorch**, Tensorflow, Keras Open-Cv, Scikit-learn, Pandas, Numpy, SciPy, Matplotlib, NetworkX, etc.

INVITED TALKS/ CONFERENCE TALKS

- ◇ Research Demonstration: **E-Day:Auburn University**, Auburn University, 2025
- ◇ Poster demonstration: **Faculty Showcase for Undergraduate Research Opportunities**, Auburn University, 2024
- ◇ Research Demonstration: **E-Day, Auburn University**, Auburn University, 2024
- ◇ Poster showcase: **Scene Graph Generation**, Graduate Research Symposium 2023, Auburn University
- ◇ Oral presentation: "**IS-GGT : Iterative Scene Graph Generation With Generative Transformers**",**CVPR 2023**, Vancouver, Canada
- ◇ **3-minute thesis** competition speaker, Oklahoma State University, 2022
- ◇ CS Colloquium talk: **Scene Graph Generation**, 2022
- ◇ CS Colloquium talk: **Biomedical Object Detection** advances, 2021
- ◇ Oral presentation: **Biomedical Object Detection**, **AIPR, 2020**
- ◇ Metamaterials Research Talk: **EICT, 2014**, KUET, Khulna, Bangladesh
- ◇ **Antenna and Metamaterials** design demonstration, **Varsity Day Exhibition**, KUET, 2013
- ◇ Oral presentation: **Metamaterials designs**, **ICIEV, 2013**, Dhaka University, Dhaka, Bangladesh

MENTORING EXPERIENCE

Fall 2024 ◇ **Mentored** first year PhD Student, Zhou Chen, Auburn University

Spring 2024 ◇ **Mentored** first year PhD Student, Shanmukha Vellamcheti, Auburn University

Summer 2022 ◇ **Mentored** Daniel Beaver, as part of the undergraduate **REU program**

AWARDS

2025 ◇ I was named as an outstanding Reviewer for CVPR2025

2021 ◇ Graduate College **Robberson Summer 2021 Research and Creative Activity Grant** from Graduate College, Oklahoma State University

2020 ◇ **Computer Science Fellowship** award, department of Computer Science, Oklahoma State University

AWARDS (continued)

2000–2009 ◇ government scholarships in 2000, 2003, 2006 and non-government scholarships in 2009 for good academic performances

2003 ◇ Divisional awards in Essay writing in 2003 and institutional awards in 2005 for creative writing

Professional Services

Paper Review
- ◇ Conference on Neural Information Processing Systems, **NeuRIPs 2024, 2023**
- ◇ International Conference on Machine Learning, **ICML 2024**
- ◇ Conference on Computer Vision and Pattern Recognition, **CVPR 2025, 2024, 2022**
- ◇ International Conference on Learning Representations, **ICLR 2023**
- ◇ International Conference on Machine Learning and Applications, **ICMLA 2023**
- ◇ **ACM Multimedia 2021**
- ◇ IEEE Robotics and Automation Letters, **RA-L**
- ◇ Pattern Recognition Letters, **PRL**
- ◇ International Conference on Pattern Recognition, **ICPR 2022**

LEADERSHIP EXPERIENCE

2022 ◇ Served as a **Sports Secretary** for Bangladesh Student Association, Oklahoma State University, Stillwater, OK

REFERENCES

◇ **Dr. Sathyanarayanan N. Aakur**, Assistant Professor
Department of Computer Science and Software Engineering
Samuel Ginn College of Engineering, Auburn University
Email: **san0028@auburn.edu**
Phone: 813-357-4269

◇ **Dr. Anh Nguyen**, Associate Professor
Department of Computer Science and Software Engineering
Samuel Ginn College of Engineering, Auburn University
Email: **anhnguyen@auburn.edu**, **anh.ng8@gmail.com**
Phone: 608-334-9754

◇ **Deep Patel**, Associate Researcher
Department of Machine Learning, NEC Labs America Inc.
Princeton, New Jersey
Email: **dpatel@nec-labs.com**
Phone: 609-951-4817

◇ **Dr. Shubhra Kanti Karmaker (Santu)**, Assistant Professor
L3Harris Engineering Center, Room 255

Department of CS, University of Central Florida
Email: **sks0086@auburn.edu**
Phone: +1-217-979-3244