ZAHIDUR TALUKDER

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OBJECTIVE

My research focuses on privacy-preserving machine learning, addressing data privacy, security, fairness, and AI sustainability for large-scale LLMs. As one of 41 MLCommons Machine Learning and Systems Rising Stars globally in 2024, I am committed to shaping secure and ethical AI solutions for the future.

EDUCATION

PhD Candidate, Computer Science, The University of Texas at Arlington, GPA: 4.00/4.00 Sep 2019 - Dec 2024
Research Interests: Machine Learning, Algorithms, Cybersecurity & Data Privacy, AI Sustainability, Economics of Computing

EXPERIENCE

Graduate Research Assistant *Sep 2019 - Present*
Rigourous Design Lab, The University of Texas at Arlington
- Led projects on privacy-preserving ML, reducing LLM training's water footprint, improving federated learning fairness, and optimizing efficiency with advanced AI strategies.

Graduate Teaching Assistant *Sep 2019 - Present*
The University of Texas at Arlington
- Instructed graduate and undergraduate courses in algorithms & data structures, computer architecture, and more.

TECHNICAL SKILLS

- **Languages:** Python, R, Matlab, C, LaTex
- **Tools:** Tensorflow, Pytorch, NLTK, Keras, MySQL, Scikit-Learn, Pandas, Numpy, Linux, Git, CUDA, DOCKER, Matplotlib, Tableau
- **Expertise:** Machine Learning, LLM, Data Analytics, Gen AI, RAG, Transformer, GPT, NLP, Computer Vision, VAE, GAN, GPU, AWS

FEATURED PROJECTS

Reducing Water Footprint for LLM based Training *Jan 2024 - Present*
Implemented GLB to minimize the water footprint of data center LLM training, using efficient scheduling, strategic data center selection, and model compression (LoRA, QLoRA, RAG), reducing water usage by 30%. ASPLOS 2024 (Submitted)

FairHeteroFL: Hardware-Sensitive Fairness in Federated Learning with Heterogeneous Environment *Aug 2022 - Present*
Developed "FairHeteroFL," a hardware-sensitive FL method, to enhance fairness among heterogeneous clients, reduce variance in test loss by 30%, and improve overall FL performance, validated by LR, CNN, RNN, and NLP models. ACM TOMPECS 2024

FedSRC: Computation and Communication Efficient Federated Learning with Self-Regulating Clients *Jan 2022 - Present*
Developed "FedSRC" to enhance FL efficiency, enabling auto client participation decisions, reducing communication costs by 30%, computation costs by 55%, and optimizing global model performance. *Publications:* SIGMETRICS 2022, AAAI 2024 (Submitted)

FedASL: Auto-Weighted Aggregation for Heterogeneous Federated Learning *Jan 2021 - May 2022*
Introduced "FedASL", a novel Federated Learning (FL) approach that uses local training loss for auto-weighted model aggregation, effectively addressing data quality issues in FL and reducing computation costs by up to one-tenth. *Publications:* IEEE EDGE 2022

Enabling Low-Cost Server Level Power Monitoring in Data Centers Using Conducted EMI *Sep 2019 - Present*
Developed a low-cost, novel power monitoring approach in real-time streaming data, utilizing a single sensor to extract power consumption information from all servers, leveraging conducted electromagnetic interference. *Publications:* SENSYS 2022, 2023

SELECTED PUBLICATIONS

- "Computationally Efficient Auto-Weighted Aggregation for Heterogeneous Federated Learning"
  Zahidur Talukder, Mohammad A. Islam (IEEE EDGE 2022) (code)
- "FedSRC: Computation and Communication Efficient Federated Learning with Self-Regulating Clients"
  Zahidur Talukder, Mohammad A. Islam (SIGMETRICS 2022)
- "Enabling Low-Cost Server Level Power Monitoring in Data Centers Using Conducted EMI"
  Pranjol Gupta, **Zahidur Talukder**, Tasnim Abir, Phuc Nguyen, Mohammad A. Islam (SENSYS 2023)

RECOGNITION

- **Machine Learning and Systems Rising Stars 2024** - MLCommons 2024 (Link)
- **Best Poster Award Honorable Mention** - SCRF@UTA 2022, SCRF@UTA 2023
- **Secondary and Higher Secondary Board Merit Scholarship** - Bangladesh Education Board (top 0.1%)

VOLUNTEERING EXPERIENCE

- I-Engage Graduate Summer Mentor- Summer 2023, Summer 2024
- Student volunteer at SC22, Dallas, Tx, USA
- UTA LSAMP - Summer Research Academy mentor in 2022
- Culture Secretary of Bangladesh Student Organization (BSO) in 2021
- Reviewer for the ICLR (2024), NeurIPS (2024), ACM Performance Evaluation (2024), WOAH (2024, 2020)