Koushani Chakrabarty

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Education

- **University at Buffalo, The State University of New York** — Buffalo, NY
  PhD in Biomedical Engineering — *January 2024 - Present*
- **University at Buffalo, The State University of New York** — Buffalo, NY
  MS in Computer Science — *August 2022 - December 2023*
- **University at Buffalo, The State University of New York** — Buffalo, NY
  MS in Electrical Engineering — *January 2023 - May 2024*
- **West Bengal University of Technology** — Kolkata, India
  B.Tech. in Electronics and Communications Engineering — *August 2011 - May 2015*

Research Experience

- **Ying Lab, University at Buffalo** — Buffalo, NY
  Graduate Research Assistant — Dr. Leslie Ying — *January 2024 - Present*
  - Conducting research on MRI signal reconstruction using Cold Diffusion Models, which outperform benchmark models in reconstructing high-fidelity MRI images from undersampled k-space.
  - Developing novel Explainable AI (XAI) techniques, such as SHAP for k-space, to analyze and enhance Cold Diffusion Models, addressing potential research directions like latent space diffusion for more efficient image reconstruction.
- **Gradient Lab, University at Buffalo** — Buffalo, NY
  Graduate Research Assistant — Dr. Seyyedali Hossainalipour — *May 2023 - Present*
  - Demonstrated a 15% improvement in Brain EEG classification accuracy using a multimodal model combining EEG and spectrogram data, with a Vision Transformer (ViT) for the spectrogram modality.
  - Utilizing Diffusion Models to generate augmentable EEG data, showcasing further enhancement in classification accuracy through this novel augmentation approach.
- **SAIR Lab, University at Buffalo** — Buffalo, NY
  Research Intern— Dr. Chen Wang — *June 2023 - January 2024*
  - Developed swarm reinforcement learning methods for UAV payload delivery systems.
  - Reduced computational overhead by 30% in path planning using reinforcement learning.
- **Tata Institute of Fundamental Research, CERN** — Geneva, Switzerland
  Computational Physics Intern— Dr. Brij Jashal — *March 2021 - March 2022*
  - Parallelized track reconstruction algorithms for the Large Hadron Collider using NVIDIA GPUs.
  - Contributed to the Allen high-throughput GPU trigger for High Energy Physics.

Work Experience

- **Ying Lab, University at Buffalo** — Buffalo, NY
  PhD Candidate — Dr. Leslie Ying — *January 2024 - Present*
  - Pioneered novel Explainable AI (XAI) techniques for Cold Diffusion Models, enhancing MRI reconstruction accuracy from undersampled k-space data by leveraging advanced degradation and latent space restoration methods.
- **Gradient Lab, University at Buffalo** — Buffalo, NY
  Graduate Researcher — Dr. Seyyedali Hossainalipour — *May 2023 - Present*
  - Built a multimodal seizure detection model combining EEG and spectrogram data, achieving 15% higher accuracy using Vision Transformers and Diffusion Model-based data augmentation.
- **Tata Consultancy Services** — Chennai, India
  Assistant Systems Engineer — *July 2015 - July 2017*
  - Developed a resource tracking application, optimizing multi-location resource management using Java, JDBC, and SQL.
  - Improved customer and resource management efficiency by 25% for an international telecommunications client.
  - Created an applications portal using AngularJS, CSS, JavaScript, and Shell scripting.

Skills

- **Languages**: Python, C++, Java, R, SQL
- **Tools**: Databricks, Apache Spark, MLOps platforms, TensorRT, Triton, Docker
- **Deep Learning**: PyTorch, TensorFlow, Explainable AI, Diffusion Models, LLMs, Computer Vision, Reinforcement Learning, Multimodal Learning, Foundational Models