

## EDUCATION

Present Aug 2021	<b>Georgia Institute of Technology, Ph.D. in ECE (Concentration in AI), Atlanta, GA</b> <ul style="list-style-type: none"> <li>&gt; Research in efficient AI and sparsity deep learning.</li> <li>&gt; Applications of efficient AI in federated, multi-task and multi-modal learning.</li> <li>&gt; Research interests : Efficiency in large models, including LLMs, VLMs, and mixture of experts.</li> <li>&gt; Supervised by <a href="#">Dr. Vince Calhoun</a> and <a href="#">Dr. Sergey Plis</a>.</li> <li>&gt; CGPA : 4.0/4.0</li> </ul>
Aug 2021 Aug 2019	<b>Georgia Institute of Technology, Master's in ECE Program, Atlanta, GA</b> <ul style="list-style-type: none"> <li>&gt; Research in Sparse Neural Networks and Neural Network Pruning.</li> <li>&gt; CGPA : 4.0/4.0</li> </ul>

## WORK EXPERIENCE

Present May 2024	<b><a href="#">Dolby Laboratories</a> : Experience Delivery Lab</b> <b>Ph.D. Research Intern, Atlanta, GA</b> <ul style="list-style-type: none"> <li>&gt; Currently working on efficient fine-tuning of LLMs and VLMs.</li> <li>&gt; Aligning off-the-shelf foundation LLMs and Vision model towers for multimodal tasks.</li> </ul> <div>Efficiency in AI LLMs Computer Vision Research Vision Language Models Multimodal</div>
Aug 2022 May 2022	<b>FAIR at <a href="#">Meta AI</a> : Fundamental (previously Facebook) AI Research</b> <b>Research Scientist Intern, Menlo Park, CA</b> <ul style="list-style-type: none"> <li>&gt; Designed &amp; implemented a git-like library for version control &amp; model compression called weigit.</li> <li>&gt; Weigit was integrated as part of the open-source <a href="#">facebookresearch/fairscale</a> library.</li> <li>&gt; Research on extreme sparsity in deep learning models using signal processing based techniques (e.g. FFT and DCT) during training.</li> </ul> <div>Sparse Neural Networks Model Compression Model Pruning Efficient AI Signal Processing Research</div>
Present Aug 2019	<b><a href="#">TReNDS Center</a> at Georgia Tech</b> <b>Graduate Research Assistant, Atlanta, GA</b> <ul style="list-style-type: none"> <li>&gt; Working on sparse deep learning, efficient AI and its applications in federated, reinforcement, multi-task and multimodal learning.</li> <li>&gt; Designed a new sparse projection algorithm : <a href="#">TMLR</a>, <a href="#">ICLR-HAET</a>.</li> <li>&gt; Developed a novel sparse offline-RL method : <a href="#">NeurIPS-offlineRL</a>.</li> <li>&gt; Designed a novel communication efficient federated learning method : <a href="#">arXiv</a>.</li> </ul> <div>Sparse deep learning Model Pruning Efficient AI Signal Processing Research pytorch</div>
April 2018 Oct 2017	<b>BAT Bangladesh</b> <b>Team Leader, Full Time, Dhaka, Bangladesh</b> <ul style="list-style-type: none"> <li>&gt; One of the 4 Team Leaders in the Manufacturing Department of Bangladesh's largest production facility.</li> <li>&gt; Learned project management and data analysis in a large-scale multinational corporation by leading a group of over 80 Engineers, Technicians and Staffs.</li> </ul> <div>Project Managemet Team Leader Data Driven Decision Making</div>

## SELECTED RESEARCH PROJECTS

May 2023 Aug 2020	<b>Sparsity in Deep Learning, Model Compression and Pruning</b> <b><a href="#">TReNDS Center</a>, Atlanta, GA</b> <ul style="list-style-type: none"> <li>&gt; Developed a novel Group Sparse Projection algorithm for training sparse deep models. published in <a href="#">TMLR</a>, initial work at <a href="#">ICLR HAET</a> workshop.</li> <li>&gt; Sparse training and benchmarked large models on vision datasets including ImageNet.</li> <li>&gt; Conducted sparse training and benchmarked large models on vision datasets, including ImageNet.</li> <li>&gt; Models pruned even in the extreme sparsity range (&gt;90%) retained close to baseline accuracy.</li> </ul> <div>Model Compression Sparse Deep Learning Computer Vision Neural Network Pruning PyTorch NumPy Distributed Training</div>
----------------------	--

May 2024 January 2023	<b>Communication Efficient Federated Learning</b> <b>TReNDS Center</b> , Atlanta, GA <ul style="list-style-type: none"> <li>&gt; Developed a communication efficient method for Federated learning with non-IID data.</li> <li>&gt; Trained sparse models deployed on decentralized framework used by Neuroimaging labs around the world.</li> <li>&gt; Around 1.7 times wall-time acceleration observed in a real-world FL setup.</li> <li>&gt; Preliminary work published at ICLR Sparse Neural Network Workshop and full work on <a href="#">arXiv</a>.</li> </ul> <div> <span>Sparse Federated Learning</span> <span>Model Compression</span> <span>Sparse Deep Learning</span> <span>Computer Vision</span> <span>PyTorch</span> <span>Differential privacy</span> </div>
Present May 2021	<b>Sparsity in Reinforcement Learning and efficient multi-task Learning in RL</b> <b>TReNDS Center</b> , collaboration with <b>MILA</b> , Montreal, CA, Atlanta, GA <ul style="list-style-type: none"> <li>&gt; Working on network pruning for offline and online RL tasks before training. Preliminary work accepted at <a href="#">NeurIPS workshop</a>, full work under review.</li> <li>&gt; Work done in collaboration with <a href="#">Dr. Doina Precup</a>'s group at Montreal Institute for Learning Algorithms (MILA).</li> </ul> <div> <span>Reinforcement Learning</span> <span>Network Pruning</span> <span>Sparsity</span> <span>Python</span> <span>PyTorch</span> <span>NumPy</span> </div>
Mar 2016 Sep 2015	<b>Predicting Location of Audio Recordings</b> <b>IEEE Signal Processing Cup : Team and Programming Lead</b> IUT, Dhaka, BD <ul style="list-style-type: none"> <li>&gt; Predicted the location of recording of audio files, exploiting embedded background power signatures from nearby electrical power lines via machine learning techniques.</li> <li>&gt; Led the Islamic University of Technology (IUT) Signal Processing Cup team to 11th rank worldwide and an Honorable Mention in IEEE Signal Processing Cup, 2016.</li> </ul> <div> <span>Machine Learning</span> <span>Signal Processing</span> <span>Fourier Analysis</span> <span>FFT</span> <span>Short Time Fourier Transform</span> <span>Audio Data</span> <span>Matlab</span> </div>

## </> TECHNICAL STRENGTHS

- > Deep Learning, Machine Learning, Computer Vision, Efficient AI.
- > Python, C++, Matlab.
- > PyTorch, Numpy, Pandas.
- > Linux, slurm, cluster computing, bash scripting.

## RELEVANT COURSEWORK

Statistical Machine Learning	Convex Optimization
Linear Algebra	Advanced DSP
Advanced Programming Techniques	Fourier Analysis
Information processing in Neural Systems	Real Analysis

## PUBLICATIONS AND PRE-PRINTS

2024	<b>Riyasat Ohib</b> , Bishal Thapaliya, Gintare Karolina Dziugaite, Jingyu Liu, Vince Calhoun and Sergey Plis. <i>Unmasking Efficiency : Learning Salient Sparse Models in Non-IID Federated Learning</i> . [ <a href="#">arXiv</a> ]
2024	<b>Riyasat Ohib</b> , Bishal Thapaliya, Jingyu Liu, Vince Calhoun and Sergey Plis. <i>Efficient Federated Learning on distributed Neuroimaging Data</i> . [under review]
2023	Samin Yeasar, <b>Riyasat Ohib</b> , Sergey Plis and Doina Precup. <i>Multitask Sparse Reinforcement Learning</i> . [under review]
2023	<b>Riyasat Ohib</b> , Bishal Thapaliya, Jingyu Liu, Vince Calhoun and Sergey Plis. <i>Decentralized Sparse Federated Learning for Efficient Training on Distributed Neuroimaging Data</i> . <b>Neurips Medical Imaging Workshop, 2023</b>
2023	<b>Riyasat Ohib</b> , Bishal Thapaliya, Pratyush Reddy, Jingyu Liu, Vince Calhoun and Sergey Plis. <i>SalientGrads : Sparse Models for Communication Efficient and data aware Distributed Federated Training</i> . <b>ICLR Sparsity in Neural Networks workshop (SNN), 2023</b> . <a href="#">webpage</a> .
2022	<b>Riyasat Ohib</b> , Nicolas Gillis, Niccolo Dalmasso, Vamsi Potluru and Sergey Plis. <i>Explicit Group Sparse Projection with applications to Deep Learning and NMF</i> . <b>Transactions on Machine Learning Research (TMLR), 2022</b> . <a href="#">webpage</a>
2021	Samin Yeasar, <b>Riyasat Ohib</b> , Sergey Plis and Doina Precup. <i>Single-Shot Pruning for Offline Reinforcement Learning</i> . <b>NeurIPS Offline Reinforcement Learning workshop, 2021</b> . <a href="#">paper</a> <a href="#">webpage</a>
2021	<b>Riyasat Ohib</b> , Nicolas Gillis, Sameena Shah, Vamsi Potluru, Sergey Plis. <i>Grouped Sparse Projection for Deep Learning</i> . <b>ICLR Hardware Aware Efficient Training workshop, 2021</b> . <a href="#">paper</a> <a href="#">webpage</a>
2018	<b>Riyasat Ohib</b> , Samin Arnob, Muhtady Muhaisin, Riazul Arefin, Taslim Reza and MR. Amin. <i>ENF Based Machine Learning Classification for origin of Media Signals : Novel Features from Fourier Transform Profile</i> . <b>Accepted at ICEECS 2018</b> presented on Nov 13-14, 2018.
2017	Samin Yeasar, <b>Riyasat Ohib</b> , and Muhtady Muhaisin. <i>Power line extraction process from Bangladesh grid and exploring ENF based classification accuracy using machine learning</i> . <b>IEEE R10HTC Conference, 2017</b> . <a href="#">paper</a>
2016	<b>Riyasat Ohib</b> , Samin Yeasar Arnob, Md Sayem Ali, Rakibul Hasan Sagor, and Md Ruhul Amin. <i>Metal nanoparticle enhanced light absorption in Ga-As thin-film solar cell</i> . <b>IEEE Asia-Pacific Conference on Applied Electromagnetics</b> , pages 89–93, 2016. <a href="#">paper</a>

### WEIGIT : A GIT-LIKE NEURAL NETWORK MODEL-WEIGHT TRACKING LIBRARY

2022

 [github.com/facebookresearch/fairscale](https://github.com/facebookresearch/fairscale)

- > Open source contribution, project was added as part of the open source fairscale library maintained by Meta AI FAIR.
- > Designed & implemented a git-like model weight tracking library for tracking the changes of model weights during training.

Software Engineering Open Source Contribution SW Design library implementation Compression

### DRONE SIMULATION USING OPENGL AND OPENMPI

2019

 [github.com/riohib/UAV-Simulation-OpenGL-OpenMPI](https://github.com/riohib/UAV-Simulation-OpenGL-OpenMPI)

- > A C++ implementation of flight simulation for a pack of drones following physics mechanics equations.
- > Graphics was rendered using OpenGL on C++.
- > Each drone physics was handled by a separate compute node and all drones were coordinated among nodes using OpenMPI.

C++ OpenGL OpenMPI Physics Simulation Graphics

### ENF DATA ACQUISITION AND ANALYSIS :

2016

 [github.com/riohib/IEEE-SP-Cup-2016](https://github.com/riohib/IEEE-SP-Cup-2016)

- > Collected 10 hours of Electric Network Frequency (ENF) data from the Bangladesh Power Grid.
- > Analyzed data using Fourier Analysis and classified with Support Vector Machines.

Machine Learning Fourier Analysis Support Vector Machines Matlab