# Md Abul Hayat

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## Education

- **University of Arkansas** — Fayetteville, AR
  *PhD, Electrical Engineering* — *July 2023*
- **University of Arkansas** — Fayetteville, AR
  *MS, Statistics & Analytics* — *May 2021*
- **Bangladesh University of Engineering & Technology (BUET)** — Dhaka, Bangladesh
  *BS, Electrical & Electronic Engineering* — *September 2015*

## Technical Skills

- **Languages**: Python, MATLAB, R, SQL, C++, C
- **ML Frameworks**: PyTorch, Transformers, XGBoost, scikit-learn, pandas, GluonTS, TensorFlow-Keras
- **Others**: Git, LaTeX, Tableau, Jupyter, AMPL, Bash, Slurm, High-Performance Computing

## Experience

- **JPMorgan Chase & Co.** — Brooklyn, NY
  *Quant Modeling - Sr. Associate* — *July 2023 - Present*
  - Independent model validation and benchmark development for anti-money laundering applications.
  - Critical analysis of model risk, assessing limitations of model assumptions and ensuring explainability.
  - Models: NLP and Tree-based.
- **Amazon Web Services** — Seattle, WA
  *Applied Scientist Intern* — *May 2021 - August 2021*
  - Feasibility testing of MQ-RNN algorithm in anomaly detection for different types of univariate time-series.
  - Framework: GluonTS, Platform: AWS EC2, Service: Amazon Lookout for Metrics.
- **Lawrence Berkeley National Laboratory** — Berkeley, CA
  *Summer Intern* — *May 2020 - August 2020*
  - Lead developer of contrastive self-supervised representation learning for galactic images. This approach outperformed state-of-the-art on several relevant tasks. [Journal][Github][Website]
  - Dataset size: 300 GB (1.3 million images), Model: Momentum Contrast for Unsupervised Visual Representation Learning (MoCo), Framework: PyTorch with "DistributedDataParallel", Mentor: Mustafa Mustafa, Ph.D.
- **Nokia Bell Labs** — Murray Hill, NJ
  *Summer Intern* — *June 2019 - August 2019*
  - Implemented U-Net and DenseNet-based deep learning segmentation algorithms for OCT images using Keras.
- **University of Arkansas** — Fayetteville, AR
  *Graduate Assistant* — *August 2017 - July 2023*
  - Proposed a novel integral pulse frequency modulation-based modeling of peripheral arterial (PAP) and venous pressure (PVP) signals to extract respiratory rate and heart rate variability using MATLAB. [Journal][Github]
  - Developed first-ever Kalman filter and hidden Markov model-based unsupervised anomaly detection algorithm for PVP signals under Gaussian mixture assumption. Languages: R, MATLAB. [Journal][Github]
  - Proposed a Gaussian mixture model-based Bayesian unsupervised algorithm for rice panicle segmentation using Markov chain Monte Carlo techniques using drone images. This outperformed the then state-of-the-art algorithm. Language: MATLAB. [Journal][Github]
  - First-ever successful classification of hydrated and dehydrated patients using PVP signals with GLM with LASSO (Sensitivity $> 96\%$ and Specificity $> 93\%$). Language: MATLAB. [Journal]
- **Grameenphone - Telenor Bangladesh** — Dhaka, Bangladesh
  *System Engineer* — *October 2015 - August 2017*
  - Lead planning and operations engineer executing radio diversity and aggregation techniques for 400+ BTS/nodeBs.

## Selected Publications [Google Scholar Link]

- **M. A. Hayat**, Jingxian Wu, et.al., "Modeling Peripheral Arterial and Venous Pressure Signals with Integral Pulse Frequency Modulation," Biomedical Signal Processing & Control, September 2023. [Journal][Github]
- **M. A. Hayat***, George Stein*, et. al., "Self-Supervised Representation Learning for Astronomical Images," The Astrophysical Journal Letters, December 2020. [Journal][arXiv][Media][Github][Website][YouTube] {*Equal contributions}
- **M. A. Hayat**, et.al., "Estimating Galactic Distances From Images Using Self-supervised Representation Learning," Machine Learning and the Physical Sciences Workshop, 34th Conference on Neural Information Processing Systems (NeurIPS), December 2020. [Paper][arXiv][Poster]
- **M. A. Hayat**, Jingxian Wu, et.al., "Unsupervised Anomaly Detection in Peripheral Venous Pressure Signals with Hidden Markov Models," Biomedical Signal Processing & Control, September 2020. [Journal][Github]
- **M. A. Hayat**, Jingxian Wu, et.al., "Unsupervised Bayesian Learning for Rice Panicle Segmentation with UAV Images," Plant Methods, February 2020. [Journal][Github]
- P. Bonasso, K. Sexton, **M. A. Hayat**, et. al., "Venous Physiology Predicts Dehydration in the Pediatric Population," Journal of Surgical Research, March 2019. [Journal]

## Grants & Scholarships

- Graduate student ambassador (EE), University of Arkansas — Spring 2023, Fall 2022
- Porter W. Stone scholarship, University of Arkansas — May 2022
- Bangladesh-Sweden trust fund travel grant, Govt. of the People's Republic of Bangladesh — February 2019
- Full undergraduate tuition-waiver with scholarship, Govt. of the People's Republic of Bangladesh — May 2010

## Awards & Honours

- Outstanding Graduate Teaching Assistant — Fall 2022
- Research Affiliate, Lawrence Berkeley National Laboratory — September 2020 - August 2021
- Runner-up, 'Cadence India Xtensa Design Contest - Adaptive Beamforming with Microphone Array' [Certificate] — 2015
- 11th, National Undergraduate Mathematics Olympiad (Dhaka chapter) — 2013
- Second Runner-up, Bangladesh Mathematical Olympiad (Rajshahi chapter) — 2006, 2008

## Teaching Experience

- ELEG 2103 (Electric Circuits I) - Primary Instructor — Summer, Spring 2023
- ELEG 3124 (Systems & Signals) - Lab Instructor — Fall 2022, 2021, 2020, 2019
- ELEG 3214 (Electronics I) - Lab Instructor — Spring 2020

## Leadership

- President, Bangladesh Student Organization, University of Arkansas — June 2018 - May 2019
- Representative (EE), Graduate-Professional Student Congress, University of Arkansas — July 2018 - December 2018

## Membership

IEEE, SIAM, American Statistical Association, Institute of Mathematical Statistics

## Research Interest

Data Science, Deep Learning, Statistical Learning, Bayesian Statistics, Mathematical Finance, Digital Signal Processing

## Visa & Employment Authorization

Status: F-1, I-766/EAD: Post-completion OPT. No sponsorship is required. EB-2 NIW petition I-140 approved.