

# MD ABUL HAYAT

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CONTACT INFORMATION	3217 Bell Engineering Center 800 W Dickson St, Fayetteville, AR 72701	mahayat@uark.edu <a href="https://mahayat.github.io/">https://mahayat.github.io/</a>
RESEARCH INTEREST	Biomedical Signal Processing, Statistical Learning, Deep Learning, Bayesian Statistics	
EDUCATION	<i>PhD Student</i> , Electrical Engineering University of Arkansas, Fayetteville, AR – Supervisor: Dr. Jingxian Wu	Expected: December 2022
	<i>Master of Science</i> , Statistics & Analytics University of Arkansas, Fayetteville, AR	May 2021
	<i>Bachelor of Science</i> , Electrical & Electronic Engineering Bangladesh University of Engineering & Technology (BUET) Dhaka, Bangladesh	September 2015
COMPUTER SKILLS	<i>Programming Languages</i> : Python, MATLAB, R, C++, C, SQL <i>Machine Learning Frameworks</i> : PyTorch, GluonTS, TensorFlow-Keras, Jupyter <i>Others</i> : Bash, Git, L <sup>A</sup> T <sub>E</sub> X, High Performance Computing (HPC)	
EXPERIENCE	<i>Applied Scientist Intern</i> Amazon Web Services (AWS), Seattle, WA – Worked on unsupervised anomaly detection algorithm for univariate time series. – Mentor: Ketan Vijayvargiya	May 2021 – August 2021
	<i>Summer Intern</i> Lawrence Berkeley National Laboratory, Berkeley, CA – Lead developer of contrastive self-supervised representation learning for galactic images. Our approach outperforms state-of-the-art on several relevant tasks. – Dataset size: 300 GB. Model: Momentum Contrast for Unsupervised Visual Representation Learning (MoCo). Framework: PyTorch. – Mentor: Mustafa Mustafa	May 2020 – August 2020
	<i>Summer Intern</i> Nokia Bell Labs, Murray Hill, NJ – Implemented U-Net and DenseNet based deep learning segmentation algorithms for OCT images. – Mentor: Atefeh Mohajeri	June 2019 – August 2019
	<i>Graduate Assistant</i> University of Arkansas, Fayetteville, AR – Analysis of peripheral venous pressure (PVP) signals under different clinical conditions using deep and statistical learning. – Proposed a Integral pulse frequency modulation based modeling of arterial and venous signals. – Developed a Kalman filter and hidden Markov model based unsupervised anomaly detection algorithm for PVP signals.	August 2017 – Present

- Applied classical dimension reduction techniques (PCA, Kernel-PCA), regression techniques (GLMs with LASSO, Elastic net regularization), and classification algorithms (k-means, KNN, DBSCAN, SVM) in MATLAB and Python.
- Developed a Gaussian mixture model (GMM) based Bayesian unsupervised algorithm for rice panicle detection using Markov chain Monte Carlo (MCMC) techniques.
- Partially funded by the US National Science Foundation (NSF) under award number ECCS-1711087.

#### *System Engineer*

October 2015 – August 2017

Grameenphone, Dhaka, Bangladesh

- Grameenphone, part of the Norwegian Telenor Group, is the largest telecommunications operator in Bangladesh.
- Worked with more than 400 BTS/nodeBs of Huawei. Planned and implemented radio diversity techniques.
- Analyzed and solved performance issues like IPPM loss and Ping packet loss, MPD degradation and TCH congestion.
- Implemented different radio aggregation techniques on wireless backhaul devices.

#### PUBLICATIONS

[J5] **M. A. Hayat\***, George Stein\*, et. al., “Self-Supervised Representation Learning for Astronomical Images,” The Astrophysical Journal Letters, December 2020 [link] [arXiv] [github] [project website] [YouTube] { \* equal contribution first authors}. [IF: 7.413]

[J4] **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 [link] [github]. [IF: 3.321]

[J3] **M. A. Hayat**, Jingxian Wu, et.al., “Unsupervised Bayesian Learning for Rice Panicle Segmentation with UAV Images,” Plant Methods, February 2020 [link] [github]. [IF: 4.460]

[J2] P. Bonasso, K. Sexton, **M. A. Hayat**, et. al., “Venous Physiology Predicts Dehydration in the Pediatric Population,” Journal of Surgical Research, March 2019 [link]. [IF: 2.187]

[J1] P. Bonasso, K. Sexton, S. Mehl, M. Golinko, **M. A. Hayat**, et. al., “Lessons learned measuring peripheral venous pressure waveforms in an anesthetized pediatric population,” Biomedical Physics & Engineering Express, February 2019 [link]. [IF: 1.167]

#### CONFERENCE

[C2] S. M. Hasan, **M. A. Hayat** and M. F. Hossain, “On the downlink SINR and outage probability of stochastic geometry based LTE cellular networks with multi-class services,” 18th International Conference on Computer and Information Technology, December 2015. [link]

[C1] S. M. Hasan, M. B. Monjil, F. Mohsin, **M. A. Hayat** and A. B. M. H. Rashid, “Adaptive beamforming with a Microphone Array,” 18th International Conference on Computer and Information Technology, December 2015. [link]

#### PRESENTATIONS

[P3] **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. [pdf] [arXiv] [poster]

[P2] **M. A. Hayat**, et.al., “Rice Panicle Segmentation from UAV Images Using Multivariate Gaussian Mixture Model,” 44th Spring Lecture Series, University of Arkansas, April 2019. [poster]

[P1] **M. A. Hayat**, et. al., “Predicting Dehydration in Pediatric Patients with Peripheral Venous Waveforms,” 15th Annual Midsouth Computational Biology & Bioinformatics Society (MCBIOS), Mississippi State University, March 2018. [poster]

TALKS	<i>Self-Supervised Representation Learning for Astronomical Images</i> NERSC Data Seminar, Berkeley Lab. [YouTube]	January 2021
THESIS & DISSERTATIONS	<i>Downlink OFDMA Network Analysis with Stochastic Geometry Models</i> Undergraduate Thesis (Supervisor: Dr. Md. Farhad Hossain)	September 2015
ARTICLE REVIEWS	Springer Nature Applied Sciences	
AWARDS & HONOURS	<ul style="list-style-type: none"> <li>• A member of BUET team in ‘Xtensa Design Contest 2015’ organized by Cadence India. The team secured second place in the project entitled ‘Adaptive Beamforming with Microphone Array’. [certificate]</li> <li>• 11th (Dhaka round), ‘5th National Undergraduate Mathematics Olympiad 2013’ organized by Bangladesh Mathematical Society.</li> <li>• 60th in BUET (top 1%) and 1937th in MBBS (top 5.4%) entrance exam of 2009-10.</li> <li>• Recipient of full tuition waiver for undergraduate studies with a scholarship based on Higher Secondary Certificate (HSC) examination results of 2009-10.</li> <li>• Second runner-up of Bangladesh Mathematical Olympiad (Rajshahi chapter) in 2006 and 2008.</li> </ul>	
GRANTS	Bangladesh-Sweden Trust Fund Travel Grant (USD 715) Govt. of the People’s Republic of Bangladesh (Ministry of Finance)	February 2019
	Doctoral Student Travel Grant (USD 1,000) University of Arkansas	March 2018
TEACHING EXPERIENCE	<ul style="list-style-type: none"> <li>• ELEG 3124 (Systems &amp; Signals)</li> <li>• ELEG 3214 (Electronics I)</li> </ul>	Fall 2021, 2020, 2019 Spring 2020
MEMBERSHIP	<ul style="list-style-type: none"> <li>• Graduate Student Member, <i>IEEE</i></li> <li>• Student Member, <i>American Statistical Association</i></li> </ul>	
LEADERSHIP	President, <i>Bangladesh Student Association</i> , University of Arkansas	June 2018 – May 2019
	Representative (EE), <i>Graduate-Professional Student Congress</i> University of Arkansas	July 2018– December 2018
MORE INFORMATION	LinkedIn, Google Scholar, ORCID, GitHub	