

MD ABUL HAYAT

CONTACT INFORMATION	3217 Bell Engineering Center 800 W Dickson St, Fayetteville, AR 72701, USA	mahayat@uark.edu https://mahayat.github.io/
RESEARCH INTEREST	Biomedical Signal Processing, Statistical Learning, Deep Learning, Bayesian Statistics	
EDUCATION	<i>PhD Student</i> , Electrical Engineering University of Arkansas, Fayetteville, AR – Supervisor: Jingxian Wu, PhD	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
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. This 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, PhD	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, PhD	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 (IPFM) based modeling of arterial and venous signals. – Developed a Kalman filter and hidden Markov model based unsupervised anomaly detection algorithm for PVP signals. – 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.	August 2017 – Present

- 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.

COMPUTER SKILLS

Programming Languages: Python, MATLAB, R, C++, C, SQL

Machine Learning Frameworks: PyTorch, GluonTS, TensorFlow-Keras

Others: Bash, Git, L^AT_EX, High Performance Computing (HPC)

PUBLICATIONS

[J5] **M. A. Hayat***, George Stein*, et. al., “Self-Supervised Representation Learning for Astronomical Images,” The Astrophysical Journal Letters, December 2020 [link] [arXiv] [Media] [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: Md. Farhad Hossain, PhD)	September 2015
ARTICLE REVIEWS	Springer Nature Applied Sciences	
AWARDS & HONOURS	<ul style="list-style-type: none"> • 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] • 11th (Dhaka round), ‘5th National Undergraduate Mathematics Olympiad 2013’ organized by Bangladesh Mathematical Society. • 60th in BUET (top 1%) and 1937th in MBBS (top 5.4%) entrance exam of 2009-10. • Recipient of full tuition waiver for undergraduate studies with a scholarship based on Higher Secondary Certificate (HSC) examination results of 2009-10. • Second runner-up of Bangladesh Mathematical Olympiad (Rajshahi chapter) in 2006 and 2008. 	
GRANTS & SCHOLARSHIPS	Summer Research Graduate Assistantship University of Arkansas	Summer 2022
	Porter W. Stone Scholarship University of Arkansas	May 2022
	Bangladesh-Sweden Trust Fund Travel Grant Ministry of Finance, Govt. of the People’s Republic of Bangladesh	February 2019
	Doctoral Student Travel Grant University of Arkansas	March 2018
TEACHING EXPERIENCE	<ul style="list-style-type: none"> • ELEG 3124 (Systems & Signals) • ELEG 3214 (Electronics I) 	Fall 2021, 2020, 2019 Spring 2020
MEMBERSHIP	<i>IEEE, SIAM, American Statistical Association</i>	

LEADERSHIP	<i>President, Bangladesh Student Organization University of Arkansas</i>	<i>June 2018 - May 2019</i>
	<i>Representative (EE), Graduate-Professional Student Congress University of Arkansas</i>	<i>July 2018 - December 2018</i>
MORE INFORMATION	<i>LinkedIn, Google Scholar, ORCID, GitHub, Twitter</i>	