

Samrat Nath

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EDUCATION

University of Arkansas (UA), Fayetteville, Arkansas, USA

- Doctor of Philosophy (Ph.D.) in Electrical Engineering May 2020
 - *Cumulative GPA:* 4.00 / 4.00
 - *Courses:* Intro to Deep Learning | Machine Learning | Statistical Inference | Computational Statistics | Multivariate Analysis | Regression Analysis | Time Series Analysis | Detection and Estimation
 - *Dissertation:* [Low Latency Anomaly Detection with Imperfect Models](#)

Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh

- Bachelor of Science (B.Sc.) in Electrical and Electronic Engineering Jul 2014
 - *Cumulative GPA:* 3.71 / 4.00
 - *Courses:* Digital Signal Processing | Communication Theory | Random Signals & Process | Probability & Statistics | Control System | Power System | Digital Communications
 - *Thesis:* [Spatio-Temporal Feature Extraction Scheme for Human Action Recognition](#)

TECHNICAL

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

SKILLS

- Machine Learning Frameworks: Jupyter, Spyder, scikit-learn, TensorFlow, PyTorch, Azure
- Engineering & Data Analytic Softwares: Alteryx, Tableau, Proteus, PSpice, Orcad, Simulink
- Miscellaneous: Git, Bash, Linux, L^AT_EX, MS Office, Prezi

PROFESSIONAL EXPERIENCE

Walmart, Bentonville, Arkansas, USA

- Data Scientist Jun 2020 – Present

@ Core Services: Retail & Emerging Technologies - Merchant & Facilities Tech

- Working with the Real Estate and Manufacturing Data Analytics Team and developing data-driven solutions to drive business forward.
- Serving as a technical lead for data analytics projects involving machine learning and optimization.
- Developing, testing, and maintaining statistical models and analytical software tools.

- Summer Intern Data Analyst Jun 2019 – Aug 2019

@ Global Business Service - Digital Solutions

- Developed an app using Alteryx for estimation & optimal allocation of maintenance budget in HVAC & Refrigeration sector of stores with Regression and Optimization models built in R.

University of Arkansas, Fayetteville, Arkansas, USA

- Graduate Research Assistant Jan 2016 – May 2020

@ Intelligent Information Processing Lab

- Performed research in the areas of Optimization, Statistical Signal Processing, Machine Learning, and Wireless Communication with numerical simulations performed in MATLAB & Python.
- Published 6 journal papers, 6 conference papers, and 1 book chapter.

- Graduate Teaching Assistant Aug 2016 – May 2020

@ Department of Electrical Engineering

- Assisted in grading of undergraduate courses such as Systems and Signals, Probability and Stochastic Process, Communication Theory.
- Instructed 50 undergraduate students on average each year in MATLAB.

**RESEARCH
EXPERIENCE**

University of Arkansas

Jan 2016 – May 2020

- **Low-latency Anomaly Detection**
 - Developed a real-time algorithm for detecting false data injection attacks and state estimation in smart grid with dynamic models and evaluated the analytical performance of the algorithm using Markov-chain.
 - Formulated a low-latency algorithm for detecting bearing faults of direct-drive wind turbines utilizing the statistical distribution of stator currents at a given frequency.
 - Proposed a sequential algorithm for quick change point detection in a system with multiple post-change models under both bayesian and non-bayesian setting.
- **Optimized Scheduling**
 - Formulated a scheduling strategy for information pushing system based on optimal stopping time theory to optimize the delay and energy efficiency.
 - Designed Markov decision process (MDP) based multicast scheduling scheme in delay-constrained content-centric wireless networks while optimizing overall system cost.
 - Proposed a periodic MDP-based online policy of battery charge scheduling for grid-connected photo-voltaic systems with the objective of minimizing the long-term energy cost purchased from the grid.
- **Mobile Edge Computing**
 - Presented a Deep Reinforcement Learning- based approach for optimal dynamic computation offloading and resource allocation in multi-user mobile edge computing (MEC) systems using Deep Deterministic Policy Gradient (DDPG) algorithm.

Bangladesh University of Engineering and Technology

Mar 2013 – Jul 2014

- **Image Processing and Pattern Recognition**
 - Developed algorithms for human action recognition based on spatio-temporal variations of human silhouette while applying classification methods such as kNN and SVM.
 - Designed schemes for lip contour extraction using morphological reconstruction based segmentation approach with k-means clustering.

PUBLICATIONS ▪ **Journal**

- **S. Nath** and J. Wu, “[Quickest Change Point Detection with Multiple Post-change Models](#)” in *Sequential Analysis: Design Methods and Applications*, vol. 39, pp. 543 - 562, Oct 2020.
- **S. Nath** and J. Wu, “[Online Battery Scheduling for Grid-connected Photo-Voltaic Systems](#),” in *Journal of Energy Storage*, vol. 31, pp. 101713, Oct 2020.
- **S. Nath** and J. Wu, “[Deep Reinforcement Learning for Dynamic Computation Offloading and Resource Allocation in Cache-assisted Mobile Edge Computing Systems](#)” in *Intelligent and Converged Networks*, , vol. 1, no. 2, pp. 181-198, Sep 2020.
- **S. Nath**, J. Wu, Y. Zhao, and W. Qiao, “[Low Latency Bearing Fault Detection of Direct-drive Wind Turbines Using Stator Current](#),” in *IEEE Access*, vol. 8, pp. 44163-44174, Mar 2020.
- **S. Nath**, I. Akingeneye, J. Wu, and Z. Han, “[Quickest Detection of False Data Injection Attacks in Smart Grid with Dynamic Models](#),” in *IEEE Journal of Emerging and Selected Topics in Power Electronics (in press)*, Aug 2019.
- **S. Nath**, J. Wu, and J. Yang, “[Delay and energy efficiency tradeoff for information pushing system](#)”, in *IEEE Transactions on Green Communications and Networking*, vol. 2, no. 4, pp. 1027-1040, Dec 2018.

▪ **Book Chapter**

- **S. Nath** and J. Wu, “Dynamic computation offloading and resource allocation in cache-assisted mobile edge computing systems”, in *Edge Caching for Mobile Networks*, IET Telecommunication Series, Vol, 96, edited by V. Poor and W. Chen, The Institution of Engineering and Technology, 2021 [**in press**].

▪ **Conference**

- **S. Nath** and J. Wu, “[Dynamic Computation Offloading and Resource Allocation for Multi-user Mobile Edge Computing](#)”, in *Proc. IEEE Global Communications Conf. (GLOBECOM)*, Taipei, Taiwan, Dec 2020.
- **S. Nath**, Y. Li, J. Wu, and P. Fan, “[Multi-user Multi-channel Computation Offloading and Resource Allocation for Mobile Edge Computing](#)”, in *Proc. IEEE Intern. Commun. Conf. (ICC)*, Dublin, Ireland, Jun 2020.
- **S. Nath**, J. Wu, and H. Lin, “[Optimum Multicast Scheduling in Delay-Constrained Content-Centric Wireless Networks](#)”, in *Proc. IEEE Intern. Commun. Conf. (ICC)*, Shanghai, China, May 2019.
- **S. Nath** and J. Wu, “[Bayesian quickest change-point detection with multiple candidates of post-change models](#)”, in *Proc. IEEE Global Conf. on Signal and Information Processing (GlobalSIP)*, Anaheim, CA, U.S.A., Nov 2018.
- **S. Nath**, J. Wu, and J. Yang, “[Optimum energy efficiency and Age-of-Information tradeoff in multicast scheduling](#)”, in *Proc. Intern. Conf. on Communications (ICC)*, Kansas City, MO, U.S.A., May 2018.
- **S. Nath**, J. Wu, and J. Yang, “[Optimizing age-of-information and energy efficiency tradeoff for mobile pushing notifications](#)”, in *Proc. Intern. Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, Sapporo, Japan, Jul 2017.
- S. I. Audin, **S. Nath**, S. Basak, F. S. Rahman, R. Nath, and S. A. Fattah, “[A human action recognition scheme based on spatio-temporal variation of region of interest in horizontal and vertical direction](#)”, in *Proc. Intern. Conf. on Informatics, Electronics & Vision (ICIEV)*, Dhaka, Bangladesh, May 2014.
- F. S. Rahman, R. Nath, **S. Nath**, S. Basak, S. I. Audin, and S. A. Fattah, “[Lip contour extraction scheme based on K-means clustering in different color planes](#)”, in *Proc. Intern. Conf. on Informatics, Electronics & Vision (ICIEV)*, Dhaka, Bangladesh, May 2014.
- R. Nath, F. S. Rahman, **S. Nath**, S. Basak, S. I. Audin, and S. A. Fattah, “[Lip contour extraction scheme using morphological reconstruction based segmentation](#)”, in *Proc. Intern. Conf. on Electrical Engineering and Information & Communication Technology*, Dhaka, Bangladesh, Apr 2014.

ACADEMIC AWARDS & SCHOLARSHIPS	<ul style="list-style-type: none"> ▪ Dean’s List Award, <i>BUET</i> 2010 – 2012 • Obtained Honors (3.75) grade point in junior and senior years. ▪ University Admission Test Excellency Scholarship, <i>BUET</i> 2009 <ul style="list-style-type: none"> • Ranked in top 1% among 7000+ applicants in undergraduate admission test. ▪ Dhaka Education Board Scholarship, <i>Ministry of Education, Bangladesh</i> 2008 <ul style="list-style-type: none"> • For excellence in Higher Secondary School Certificate Examination (H.S.C). ▪ Perfect Attendance Certificate, <i>Notre Dame College, Dhaka, Bangladesh</i> 2008 <ul style="list-style-type: none"> • Maintained 100% class attendance in higher secondary school.
SYNERGISTIC ACTIVITIES	<ul style="list-style-type: none"> ▪ Journal Reviewer @ Verified Source: Publons • Algorithms 2021 • IEEE Internet of Things Journal 2021 • IEEE Transactions on Wireless Communications 2021 • IEEE Transactions on Communications 2021 • IEEE Wireless Communications Letters 2021 • IEEE Open Journal of Signal Processing 2020 • IEEE Transactions on Smart Grid 2020
PROFESSIONAL AFFILIATIONS	<ul style="list-style-type: none"> ▪ Student Member, IEEE Jan 2018 – Dec 2019 ▪ Member, IEEE Young Professionals Jan 2018 – Dec 2019 ▪ Member, IEEE Signal Processing Society Jan 2019 – Dec 2019