Taha Ameen

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Research Interests

Design and analysis of optimal and efficient algorithms for stochastic networks.

Education

University of Illinois Urbana-Champaign — *Sep* 2020 – *Present*
PhD in Electrical and Computer Engineering — *GPA:* 4.0/4.0

American University of Sharjah — *Sep* 2015 – *Dec* 2019
BS in Electrical Engineering — *GPA:* 4.0/4.0
BS in Mathematics — *GPA:* 4.0/4.0

Awards and Fellowships

- INFORMS APS Best Student Paper Prize, *Finalist* — 2024
- MAVIS Future Faculty Fellowship — 2024
- Robert T. Chien Memorial Award in Electrical Engineering — 2024
- Joan and Lalit Bahl Fellowship — 2023, 2022
- James M. Henderson Fellowship — 2021
- President's Cup, *highest GPA in undergraduate class* — 2019
- Sheikh Khalifa Scholarship — 2019
- Chancellor's Scholar Award, 100% *tuition waiver for undergraduate study* — 2015 – 2019

Publications and Preprints

Preprints and Working Papers

2. T. Ameen and B. Hajek, "Aligning Multiple Inhomogeneous Random Graphs: Fundamental Limits of Exact Recovery", *Under review at Operations Research.*

1. T. Ameen, K Kytölä and S.C. Park, "Slit-strip Ising boundary conformal field theory 2: Scaling limits of fusion coefficients", *Under review at Probability and Mathematical Physics.* [arXiv]

Accepted Publications

12. **[ISIT'25b]** T. Ameen and B. Hajek, "Detecting correlation between multiple unlabeled Gaussian networks", *To appear at IEEE International Symposium on Information Theory (ISIT) '*25. [arXiv]

11. **[ISIT'25a]** T. Ameen and B. Hajek, "Exact random graph matching with multiple graphs", *To appear at IEEE International Symposium on Information Theory (ISIT) '*25. [arXiv]
    - Poster presented at *Stochastic Networks Conference*, 2024.
    - Finalist for INFORMS *APS Best Student Paper Competition*, 2024.

10. **[ICML'24]** T. Ameen and B. Hajek, "Robust graph matching when nodes are corrupt", *International Conference on Machine Learning*, 2024. [Link]

9. **[TAC'23]** T. Ameen, S. Mukhopadhyay and N. Qaddoumi, "Computing robust forward invariant sets of multidimensional nonlinear systems via geometric deformation of polytopes", *IEEE Transactions on Automatic Control*, 2023. [Link]

8. **[WDC'22]** T. Ameen, S. Sankagiri and B. Hajek, "Blockchain security when messages are lost", *ACM Workshop on Developments on Consensus*, 2022. [Link]

7. **[MPAG'22]** T. Ameen, K. Kytölä, S.C. Park and D. Radnell, "Slit-strip Ising boundary conformal field theory 1: Discrete and continuous function spaces", *Mathematical Physics, Analysis and Geometry*, Springer, 2022. [Link]

6. **[FE'22]** S. Shahriar, J. Ramesh, A. Towheed, T. Ameen, A. Sagahyroon and A. Al-Ali, "NICE: Narrative Integrated Career-Exploration Platform", *Frontiers in Education*, 2022. [Link]

5. **[DCC'21]** UIUC Info Theory Students, S. Basu and L. Varshney, "The twelvefold way of non-sequential lossless compression", *IEEE Data Compression Conference*, 2021. [Link]

4. **[Access'20]** T. Ameen, M. Hasan and M. Ismail, "A Novel Medium Access Control Algorithm for Ad Hoc Networks based on Ising Model", *IEEE Access*, 2020. [Link]

3. **[PhyCom'20]** T. Ameen, Y. Aborahama, M. Hasan and M. Ismail, "A PDE-based approach for the evaluation of probability of starvation in video streaming", *Physical Communication*, Elsevier, 2020. [Link]

2. **[WTS'20]** T. Ameen, M. Hasan and M. Ismail, "A queue-length based approach to metropolized Hamiltonians for distributed scheduling in wireless networks", *IEEE Wireless Telecommunications Symposium*, 2020. [Link]

1. **[Allerton'19]** T. Ameen, S. Mukhopadhyay and S. Farhana, "A Novel Expression for Computing Time Response of LTI Systems of Arbitrary Order with Applications to Fractional and Stochastic Control", *Allerton Conference on Communication, Control and Computing*, 2019. [Link]

Research Experience

PhD Research: University of Illinois Urbana-Champaign *Urbana, IL, USA*
Statistical Inference on Random Networks *Aug 2022 – Present*

- Studied fundamental limits of the graph matching problem – impacts of heterogeneity, multiple graphs and robustness considerations.
- Studied security of blockchain proof-of-work protocol under unbounded message delays.

Research Intern: Nokia Bell Labs *Murray Hill, NJ, USA*
Efficient Hybrid Beamforming for Multiple Access in mmWave Systems *June 2022 – Aug 2022*

- Designed and implemented a software framework to test and compare multiple access algorithms.
- Developed an algorithm for hybrid beamforming at base stations for 5G and beyond, accounting for throughput, latency and power efficiency.

Research Intern: Department of Mathematics, Aalto University *Espoo, Finland*
Scaling Limits of the Ising Model *June 2019 – Aug 2019*

- Studied the scaling limit of the planar Ising model in a novel geometry and its relation to conformal field theory.

Research Associate: American University of Sharjah *Sharjah, UAE*
Microwave Sensing for Crack Detection in Railway Tracks *Dec 2019 – Aug 2020*

- Designed, developed and deployed an autonomous robot that uses microwaves to scan railway tracks for cracks and classifies their severity.
- The project included a sensing module, signal processing module, communications module and a neural network for crack severity estimation.

Selected Talks and Posters

- INFORMS APS Best Student Paper Award Competition, 2024.
- INFORMS Annual Meeting, APS Session on Theoretical Advances in Networks, Dynamics and Inference, 2024.
- IDEAL Workshop at Northwestern University, 2024.
- Stochastic Networks Conference, 2024.
- International Conference on Machine Learning, 2024.
- Coordinated Science Lab Student Conference at UIUC, 2024.
- ACM Workshop on Developments in Consensus, 2022.
- IEEE Wireless Telecommunications Symposium, 2020.
- Allerton Conference, 2019.

Coursework and Teaching

PhD Coursework at UIUC.

- Electrical Engineering: Random Processes, Information Theory, Machine Learning, Optimization, Statistical Learning Theory, Control Systems, Communication Network Analysis, MDPs and Reinforcement Learning, Quantum Information Theory.
- Mathematics: Real Analysis, Probability Theory I, Probability Theory II, Combinatorial Optimization, High Dimensional Statistics, Stochastic Processes on Graphs.

Teaching and Mentorship.

- Teaching Assistant: ECE 534 (Random Processes): *Spring* ′24, *Fall* ′24. ECE 543 (Statistical Learning Theory): *Spring* ′25.
- Undergraduate Mentor: Academic Support Center, 2016-19.

Technologies

Software: Python – *NumPy, PyTorch, Pandas*, C/C++, MATLAB, Simulink, Comsol, Mathematica, PSPICE, Multisim, Cadence, HFSS, MS Office Suites.