

Washim Uddin Mondal

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EMPLOYMENT

Assistant Professor | Indian Institute of Technology Kanpur | 14 Feb 2024 - Current | Kanpur, UP, India

- Joined the Department of Electrical Engineering (EE)

Postdoc | Purdue University | 12 April 2021 – 31 December 2023 | West Lafayette, Indiana, USA

- Worked with Prof. Satish V. Ukkusuri and Prof. Vaneet Aggarwal on the theory of reinforcement learning and its application in large networked systems.

Quantitative Researcher | WorldQuant LLC | July 2016 – December 2016 | Mumbai, India

- Worked on framing predictive mathematical models to anticipate price movements in stock markets.

EDUCATION

Ph. D. | Indian Institute of Technology Kharagpur | 4 January 2017 - 4 January 2021

- Worked under the supervision of Prof. Goutam Das at G. S. Sanyal School of Telecommunications.
- Converted into Prime Minister's Research Fellowship (PMRF) in July 2018.

B. Tech.-M.Tech. Dual Degree (E&ECE) | Indian Institute of Technology Kharagpur | July 2011 - April 2016

- M. Tech. Specialization in Telecommunications.
- Final Cumulative Grade Point Average (CGPA) was **9.51 / 10.0**.

10+2 | Burdwan Municipal High School | Burdwan | West Bengal

- Passed the Higher Secondary Examination in May 2011 with **90.6%** marks.
- Passed the Secondary Examination in May 2009 with **90.87%** marks.

EXPERIENCE

Indian Army | Special Invitee | 27 September 2017 – 4 October 2017 | New Delhi, India

- Invited by Directorate General of Signal Intelligence, Indian Army to solve a problem of national importance.

École Polytechnique Fédérale de Lausanne (EPFL) | Internship | May 2014 – July 2014 | Lausanne, Switzerland

- Analytical modelling and simulation of different optical properties of carbon nanotube in radial mode of vibration.
- Performed under the supervision of Prof. Tobias J. Kippenberg.

AWARDS

- 2025 Prime Minister Early Career Research Grant (PMECRG)
- 2022 Winner of Graduate Thesis Evaluation in 7 minutes (GraTE-7) competition by IEEE Communications Society
- 2021 Best paper award at NeurIPS Workshop for Cooperative AI
- 2018 Prime Minister's Research Fellowship (PMRF)
- 2017 Appreciation Letter from Additional Director General (ADG), Signal Intelligence, Indian Army
- 2014 DAAD Scholarship
- 2011 IIT JEE | National Rank 953
- 2011 Kishor Vigyan Protsahan Yojana (KVPY) Scholarship | National Rank 81
- 2011 WB Joint Entrance Examination (Engineering) | State Rank 17
- 2011 Jagadish Bose National Science Talent Search (JBNSTS) Scholarship
- 2010 National Standard Examination in Physics | National Top 1%
- 2010 National Standard Examination in Astronomy (Senior) | State Top 1%
- 2007 National Standard Examination in Astronomy (Junior) | State Top 1%
- 2007 National Talent Search Examination (NTSE) Scholarship

JOURNAL PUBLICATIONS

- [22] G. Chaudhary, W. U. Mondal, and L. Behera, 'MOORL: A Framework for Integrating Offline-Online Reinforcement Learning', **Transactions on Machine Learning Research**, May. 2025.
- [21] W. U. Mondal, V. Aggarwal, and S. V. Ukkusuri, 'Mean-Field Approximation of Cooperative Constrained Multi-Agent Reinforcement Learning (CMARL)', **Journal of Machine Learning Research**, vol. 25, no. 260, pp. 1-33, Mar. 2024.
- [20] L. Ling, W. U. Mondal, and S. V. Ukkusuri, 'Cooperating Graph Neural Networks with Deep Reinforcement Learning for Vaccine Prioritization', **IEEE Journal of Biomedical and Health Informatics**, vol. 28, no. 8, pp. 4891-4902, Aug. 2024.
- [19] W. U. Mondal, V. Goyal, S. V. Ukkusuri, G. Das, D. Wang, M. -S. Alouini, and V. Aggarwal, 'Near-Perfect Coverage Manifold Estimation in Cellular Networks via Conditional GAN', **IEEE Networking Letters**, vol. 6, no. 2, pp. 97-100, Jun. 2024.
- [18] R. Wang, W. U. Mondal, M. A. Kishk, V. Aggarwal, and M. -S. Alouini, 'Terrain-Based Coverage Manifold Estimation: Machine Learning, Stochastic Geometry, or Simulation?', **IEEE Open Journal of the Communications Society**, vol. 5, pp. 633-648, 2024.
- [17] W. U. Mondal, and V. Aggarwal, 'Reinforcement Learning with Delayed, Composite, and Partially Anonymous Reward', **Transactions on Machine Learning Research**, Aug. 2023.
- [16] A. A. Sardar, D. Roy, W. U. Mondal, and G. Das, 'Coalition Formation for Outsourced Spectrum Sensing in Cognitive Radio Network', **IEEE Transactions on Cognitive Communications and Networking**, vol. 9, no. 3, pp. 580-592, Jun. 2023.
- [15] W. U. Mondal, V. Aggarwal, and S. V. Ukkusuri, 'Mean-Field Control based Approximation of Multi-Agent Reinforcement Learning in Presence of a Non-decomposable Shared Global State', **Transactions on Machine Learning Research**, May 2023.
- [14] W. U. Mondal, P. D. Mankar, G. Das, V. Aggarwal, and S. V. Ukkusuri, 'Deep Learning based Coverage and Rate Manifold Estimation in Cellular Networks', **IEEE Transactions on Cognitive Communications and Networking**, vol. 8, no. 4, pp. 1706-1715, Dec. 2022.
- [13] W. U. Mondal, V. Aggarwal, and S. V. Ukkusuri, 'On the Near-Optimality of Local Policies in Large Cooperative Multi-Agent Reinforcement Learning', **Transactions on Machine Learning Research**, Sept. 2022.
- [12] A. A. Sardar, D. Roy, W. U. Mondal, and G. Das, 'Sustainability Analysis of Opportunistic CR-IoT Network Employing Microwave Power Transfer', **IEEE Transactions on Cognitive Communications and Networking**, vol. 8, no. 3, pp. 1411-1421, Sept. 2022.
- [11] A. A. Sardar, D. Roy, W. U. Mondal, and G. Das, 'Queuing Analysis of QoS Aware Microwave Power Transfer Enabled CR-IoT Network', **IEEE Transactions on Wireless Communications**, vol. 21, no. 9, pp. 6834-6846, Sept. 2022.
- [10] W. U. Mondal, M. Agarwal, V. Aggarwal, and S. V. Ukkusuri, 'On the Approximation of Cooperative Heterogeneous Multi-Agent Reinforcement Learning (MARL) using Mean Field Control (MFC)', **Journal of Machine Learning Research**, vol. 23, no. 129, pp. 1-46, Mar. 2022.
- [9] W. U. Mondal, A. A. Sardar, and G. Das, 'Economic Analysis of Cognitive Underlay Networks: A Nash Bargaining Based Approach', **IEEE Transactions on Vehicular Technology**, vol. 70, no. 2, pp. 2024-2029, Feb. 2021.
- [8] W. U. Mondal, and G. Das, 'On Exact Distribution of Poisson-Voronoi Area in K-tier HetNets with Generalized Association Rule', **IEEE Communications Letters**, vol. 24, no. 10, pp. 2142 - 2146, Oct. 2020.
- [7] W. U. Mondal, D. Roy, S. Dutta, and G. Das, 'Economics of Resilient TWDM PONs', **IEEE/OSA Journal of Lightwave Technology**, vol. 38, no. 8, pp. 2114-2126, Apr. 2020.
- [6] W. U. Mondal, A. A. Sardar, N. Biswas, and G. Das, 'Nash Bargaining Based Economic Analysis of Opportunistic Cognitive Cellular Networks', **IEEE Transactions on Cognitive Communications and Networking**, vol. 6, no. 1, pp. 242-255, Mar. 2020.
- [5] W. U. Mondal, and G. Das, 'Economics of TWDM PONs with Nonlinear Pricing', **IEEE Communications Letters**, vol. 23, no. 5, pp. 822-825, May 2019.
- [4] W. U. Mondal, D. Roy, S. Dutta, and G. Das, 'Economic Analysis of TWDM PONs: A Sustainability and Policy-Making Perspective', **IEEE/OSA Journal of Optical Communications and Networking**, vol. 11, no. 3, pp. 79-94, Mar. 2019.
- [3] W. U. Mondal, and G. Das, 'Blocking Predation in Cellular Monopoly through Non-linear Spectrum Pricing', **IEEE Communications Letters**, vol. 21, no. 11, pp. 2464-2467, Nov. 2017.
- [2] W. U. Mondal, and G. Das, 'Uplink User Process in Poisson Cellular Network', **IEEE Communications Letters**, vol. 21, no. 9, pp. 2013-2016, Sept. 2017.
- [1] W. U. Mondal, S. Biswas, G. Das, and P. Ray, 'Traffic-Aware Green Cognitive Radio', **Physical Communication**, vol. 23, pp. 20-28, Jun. 2017.

CONFERENCE PUBLICATIONS

- [12] S. Ganesh, W. U. Mondal, and V. Aggarwal, 'A Sharper Global Convergence Analysis for Average Reward Reinforcement Learning via an Actor-Critic Approach', **International Conference on Machine Learning (ICML)**, Vancouver, Canada, 2025.
- [11] S. Ganesh, J. Chen, W. U. Mondal, and V. Aggarwal, 'Order-Optimal Global Convergence for Average Reward Actor-Critic with General Policy and Neural Critic Parametrization', **Conference on Uncertainty in Artificial Intelligence (UAI)**, Rio de Janeiro, Brazil, 2025.
- [10] S. Ganesh, W. U. Mondal, and V. Aggarwal, 'Order-Optimal Regret with Novel Policy Gradient Approaches in Infinite Horizon Average Reward MDPs', **International Conference on Artificial Intelligence and Statistics (AISTATS)**, Phuket, Thailand, 2025.
- [9] S. Chakrabarti, and W. U. Mondal, 'Uplink NOMA-Aided Multi-Device Multi-Target Integrated Sensing and Communication', **National Conference on Communications (NCC)**, New Delhi, India, 2025.
- [8] W. U. Mondal, and V. Aggarwal, 'Sample-Efficient Constrained Reinforcement Learning with General Parameterization', **Neural Information Processing Systems (NeurIPS)**, Vancouver, Canada, 2024.
- [7] Q. Bai, W. U. Mondal, and V. Aggarwal, 'Learning General Parameterized Policies for Infinite Horizon Average Reward Constrained MDPs via Primal-Dual Policy Gradient Algorithm', **Neural Information Processing Systems (NeurIPS)**, Vancouver, Canada, 2024.
- [6] W. U. Mondal, and V. Aggarwal, 'Improved Sample Complexity Analysis of Natural Policy Gradient Algorithm with General Parameterization for Infinite Horizon Discounted Reward Markov Decision Processes', **International Conference on Artificial Intelligence and Statistics (AISTATS)**, Valencia, Spain, 2024.
- [5] Q. Bai*, W. U. Mondal*, and V. Aggarwal, 'Regret Analysis of Policy Gradient Algorithm for Infinite Horizon Average Reward Markov Decision Processes', **AAAI Conference on Artificial Intelligence**, Vancouver, Canada, 2024.
- [4] W. U. Mondal, V. Aggarwal, and S. V. Ukkusuri, 'Can Mean Field Control (MFC) Approximate Cooperative Multi Agent Reinforcement Learning (MARL) with Non-Uniform Interaction?', **Conference on Uncertainty in Artificial Intelligence (UAI)**, Eindhoven, Netherlands, 2022.
- [3] W. U. Mondal, M. Agarwal, V. Aggarwal, and S. V. Ukkusuri, 'On the Approximation of Cooperative Heterogeneous Multi-Agent Reinforcement Learning (MARL) using Mean Field Control (MFC)', **Neural Information Processing Systems (NeurIPS) Workshop for Cooperative AI**, 2021, **Best paper award, Spotlight talk**.
- [2] W. U. Mondal, and G. Das, 'Predation Blocking Strategies in Real Cellular Networks and Its Impact on Spectrum Revenue', **IEEE Vehicular Technology Conference (VTC-Fall)**, Honolulu, Hawaii, USA, 2019.
- [1] W. U. Mondal, A. A. Sardar, N. Biswas, and G. Das, 'Nash Bargaining Based Economic Analysis of Cognitive Cellular Networks', **IEEE International Conference on Communications (ICC)**, Shanghai, China, 2019.

* Equal contribution.

BOOKS/MONOGRAPHS

- [1] V. Aggarwal, W. U. Mondal, and Q. Bai, 'Constrained Reinforcement Learning with Average Reward Objective: Model-Based and Model-Free Algorithms', **Foundations and Trends® in Optimization**, vol. 6, no. 4, pp. 193-298, 2024.

TEACHING

- [3] **Detection and Estimation Theory (EE623)**, Semester II, 2024-2025 at IIT Kanpur.
- [2] **Quantum Computing and Communications (EE798V)**, Semester II, 2024-2025 at IIT Kanpur.
- [1] **Information Theory (EE667)**, Semester I, 2024-2025 at IIT Kanpur.

ADVISEES

01 Ph. D. candidate, 01 MS (Research) candidate, 04 M. Tech. candidates