Md. Noor-A-Rahim, Ph.D.

Project Lead & Senior Researcher
School of Computer Science & IT
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Education

2012 – 2015 **Ph.D., University of South Australia**
School of Information Technology and Mathematical Sciences.
(Recipient of Michael Miller Medal 2015 for Outstanding thesis)

2005 – 2009 **B.Sc. (Hons), Khulna University of Engineering & Technology** in ECE
First Class Honours.

Research Interests

- Intelligent Transportation Systems, Machine Learning, Internet of Things, Wireless Networks, and DNA-based Data Storage.

Employment History

Dec. 2020 – Present **Project Lead & Senior Researcher**, School of Computer Science & IT, University College Cork, Ireland.

Dec. 2018 – Nov. 2020 **Marie Curie Research Fellow**, School of Computer Science & IT, University College Cork, Ireland.

Apr. 2016 – Nov. 2018 **Post-Doctoral Research Fellow.** Centre for Infocomm Technology (INFINITUS), School of EEE, Nanyang Technological University (NTU), Singapore.

Aug. 2015 – Nov. 2015 **Research Assistant.** Institute for Telecommunications Research, University of South Australia (UniSA), Australia. (Under Top-up scholarship)

Practical Instructor. School of Information Technology & Mathematical Sciences, University of South Australia (UniSA), Australia.

Jul. 2013 – Dec. 2013 **Teaching Assistant.** School of Information Technology & Mathematical Sciences, University of South Australia (UniSA), Australia.

Jul. 2009 – Mar. 2012 **Lecturer.** Dept. of Electronics & Communication Engineering Khulna University of Engineering & Technology, Bangladesh.

Publications and Patents

Patents

P1 H. Nguyen, **M. Noor-A-Rahim**, Y. Guan, and H. Li, 'Message relaying in vehicle-to-vehicle communication system', Granted US Patent No. US10701534B2. Acquired by NXP Semiconductors.

Journal Articles

J40 H. Nguyen, **M. Noor-A-Rahim**, Y. L. Guan, and D. Pesch, 'Cellular V2X communications in the presence of big vehicle shadowing: Performance analysis and mitigation', *IEEE Transactions on Vehicular Technology*, vol. 72, no. 3, pp. 3764–3776, 2023.

J39 **M. Noor-A-Rahim**, F. Fadhil, J. John, *et al.*, 'Towards industry 5.0: Intelligent reflecting surface (IRS) in smart manufacturing', *IEEE Communications Magazine*, Jun. 2022.

J38 L. Sedghi, Z. Ijaz, **M. Noor-A-Rahim**, K. Witheephanich, and D. Pesch, 'Machine learning in event-triggered control: Recent advances and open issues', *IEEE Access*, Jun. 2022.

J37 **M. Noor-A-Rahim**, Z. Liu, H. Lee, *et al.*, ''6G for vehicle-to-everything (V2X) communications: Enabling technologies, challenges, and opportunities", *Proceedings of the IEEE*, May 2022.

J36 L. Sedghi, J. John, **M. Noor-A-Rahim**, and D. Pesch, 'Formation control of automated guided vehicles in the presence of packet loss', *MDPI Sensors*, vol. 22, p. 3552, 9 May 2022.

J35 Z. Ijaz, **M. Noor-A-Rahim**, and D. Pesch, ''Leader-follower-based self-triggered consensus control of industrial induction motor drives", *IEEE Systems Journal*, Apr. 2022.

J34 G. Singh, A. Srivastava, V. Bohara, Z. Liu, **M. Noor-A-Rahim**, and G. Ghatak, ''Heterogeneous visible light and radio communication for improving safety message dissemination at road intersection", *IEEE Transactions on Intelligent Transportation Systems (accepted)*, Mar. 2022.

J33 **M. Noor-A-Rahim**, Z. Liu, H. Lee, G. Ali, D. Pesch, and P. Xiao, ''A survey on resource allocation in vehicular networks", *IEEE Transactions on Intelligent Transportation Systems*, vol. 23, no. 2, pp. 701–721, 2022.

J32 **M. Noor-A-Rahim**, O. Khayam, A. Mahmud, X. Li, D. Pesch, and H. V. Poor, ''Hybrid chirp signal design for long-range (LoRa) modulation", *MDPI Signals*, 2022.

J31 Y. Wang, **M. Noor-A-Rahim**, E. Gunawan, Y. L. Guan, and C. L. Poh, 'Modelling, characterization of data-dependent and process-dependent errors in DNA data storage', *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, pp. 1–12, 2022.

J30 H. Bagheri, **M. Noor-A-Rahim**, H. Lee, *et al.*, ''5G NR-V2X: Towards connected and cooperative autonomous driving", *IEEE Communications Standards Magazine*, vol. 5, no. 1, pp. 48–54, Mar. 2021.

J29 P. Li, X. Li, H. Pan, M. Khyam, **M. Noor-A-Rahim**, and S. Ge, ''Place perception from the fusion of different image representation", *Elsevier Pattern Recognition*, vol. 110, Feb. 2021.

J28 **M. Noor-A-Rahim**, O. Khayam, A. Mahmud, T. Haque, X. Li, D. Pesch, and A. Maung, ''Robust and real-time state estimation of unstable microgrids over IoT networks", *IEEE Systems Journal*, vol. 15, no. 2, pp. 2176–2185, 2021.

J27 G. Ali, B. Ayalew, A. Vahidi, and **M. Noor-A-Rahim**, ''Feedbackless relaying for enhancing reliability of connected vehicles", *IEEE Transactions on Vehicular Technology*, vol. 69, no. 5, pp. 4621–4634, May 2020.

J26 P. Li, X. Li, H. Pan, M. O. Khyam, and **M. Noor-A-Rahim**, 'Text-based indoor place recognition with deep neural network', *Neurocomputing*, vol. 390, pp. 239–247, May 2020.

J25 Y. Dong, X. Li, J. Dezert, **M. Noor-A-Rahim**, M. O. Khyam, and S. Ge, 'DSmT-based fusion strategy for human activity recognition in body sensor networks', *IEEE Transactions on Industrial Informatics*, vol. 16, no. 11, pp. 7138–7149, 2020.

J24 A. Islam, M. Ashikuzzaman, M. Khyam, **M. Noor-A-Rahim**, and M. Pickering, ''Stereo vision-based 3d positioning and tracking", *IEEE Access*, vol. 8, pp. 138 771–138 787, 2020.

J23 A. Karalikkadan, M. Khyam, **M. Noor-A-Rahim**, A. Jayasuriya, and S. Cheong Boon, 'Doppler correction in moving narrowband ultrasonic ranging sensors for small-scale motion tracking', *IEEE Sensors Letters*, vol. 4, no. 9, pp. 1–4, 2020.

J22 M. Khyam, **M. Noor-A-Rahim**, X. Li, A. Jayasuriya, A. Mahmud, A. Maung, and S. Ge, ''Simultaneous excitation systems for ultrasonic indoor positioning'', *IEEE Sensors Journal*, vol. 20, no. 22, pp. 13 716–13 725, 2020.

J21 **M. Noor-A-Rahim**, Z. Liu, Y. Guan, and L. Hanzo, ''Finite-length performance analysis of LDPC coded continuous phase modulation'', *IEEE Transactions on Vehicular Technology*, vol. 69, no. 10, pp. 12 277–12 280, 2020.

J20 H. Nguyen, X. Xiaoli, **M. Noor-A-Rahim**, Y. Guan, D. Pesch, H. Li, and A. Filippi, ''Impact of big vehicle shadowing on vehicle-to-vehicle communications'', *IEEE Transactions on Vehicular Technology*, vol. 69, no. 7, pp. 6902–6915, 2020.

J19 Y. Wang, **M. Noor-A-Rahim**, J. Zhang, Erry Gunawan, Y. L. Guan, and C. Poh, ''Oligo design with single primer binding site for high capacity DNA-based data storage'', IEEE/ACM Transactions on Computational Biology and Bioinformatics, vol. 17, no. 6, pp. 2176–2182, 2020.

J18 Y. Wang, **M. Noor-A-Rahim**, J. Zhang, Erry Gunawan, Y. Guan, and C. Poh, ''High capacity DNA data storage with variable-length oligonucleotides using repeat accumulate code and hybrid mapping', BMC Journal of Biological Engineering, vol. 13, Nov. 2019.

J17 **M. Noor-A-Rahim**, G. Ali, Y. Guan, B. Ayalew, P. Chong, and D. Pesch, ''Broadcasting performance analysis and improvement of LTE-V2V autonomous mode at road intersection'', IEEE Transactions on Vehicular Technology, vol. 68, no. 10, pp. 9359–9369, Oct. 2019.

J16 **M. Noor-A-Rahim**, O. Khayam, G. Ali, Z. Liu, D. Pesch, and P. Chong, ''Reliable state estimation of an unmanned aerial vehicle over a distributed wireless IoT network'', *IEEE Transactions on Reliability*, vol. 68, no. 3, pp. 1061–1069, Sep. 2019.

J15 A. Karalikkadan, **M. Noor-A-Rahim**, O. Khayam, and S. Boon, ''A narrowband ultrasonic ranging method for multiple moving sensor nodes'', *IEEE Sensors Journal*, vol. 19, no. 15, pp. 6289–6297, Aug. 2019.

J14 G. Ali, **M. Noor-A-Rahim**, A. Rahman, P. Chong, and Y. Guan, ''Cooperative cache transfer based on-demand coded broadcast in vehicular networks'', *ACM transactions on embedded computing systems*, vol. 18, no. 4, 38:1–38:20, Jul. 2019.

J13 D. Li, Y. Wang, **M. Noor-A-Rahim**, Y. Guan, S. Ping, Erry Gunawan, and C. Poh, ''Optimized code design for constrained DNA data storage with asymmetric errors'', *IEEE Access*, vol. 7, pp. 84 107–84 121, Jun. 2019.

J12 Y. Wang, **M. Noor-A-Rahim**, Erry Gunawan, Y. Guan, and C. Poh, ''Construction of bio-constrained code for DNA data storage'', *IEEE Communications Letters*, vol. 23, no. 6, pp. 963–966, Jun. 2019.

J11 **M. Noor-A-Rahim**, O. Khayam, X. Li, and D. Pesch, ''Sensor fusion and state estimation of IoT enabled wind energy conversion system'', *MDPI Sensors*, vol. 19, no. 7, Mar. 2019.

J10 G. Ali, **M. Noor-A-Rahim**, A. Rahman, K. Samantha, P. Chong, and Y. Guan, 'Efficient real-time coding-assisted heterogeneous data access in vehicular networks', *IEEE Internet of Things Journal*, vol. 5, no. 5, pp. 3499–3512, Oct. 2018.

J9 G. Ali, **M. Noor-A-Rahim**, P. Chong, and Y. Guan, 'Analysis and improvement of reliability through coding for safety message broadcasting in urban vehicular networks', *IEEE Transactions on Vehicular Technology*, vol. 67, no. 8, pp. 6774–6787, Aug. 2018.

J8 O. Khyam, **M. Noor-A-Rahim**, X. Li, C. Ritz, Y. Guan, and S. Ge, 'Design of chirp waveforms for multiple-access ultrasonic indoor positioning', *IEEE Sensors Journal*, vol. 18, no. 15, pp. 6375–6390, Aug. 2018.

J7 **M. Noor-A-Rahim**, O. Khyam, Y. Guan, G. Ali, K. Nguyen, and G. Lechner, 'Delay universal channel coding with feedback', *IEEE Access*, vol. 6, pp. 37 918–37 931, Jul. 2018.

J6 H. Nguyen, **M. Noor-A-Rahim**, Z. Liu, D. Jamaludin, and Y. Guan, 'A semi-empirical performance study of two-hop DSRC message relaying at road intersections', *Information*, vol. 9, no. 6, p. 147, Jun. 2018.

J5 **M. Noor-A-Rahim**, G. Ali, H. Nguyen, and Y. Guan, 'Performance analysis of IEEE 802.11p safety message broadcast with and without relaying at road intersection', *IEEE Access*, vol. 6, pp. 23 786–23 799, May 2018.

J4 **M. Noor-A-Rahim**, K. Nguyen, G. Lechner, and Y. Guan, 'Design and analysis of anytime codes for relay channels', *IEEE Transactions on Communications*, vol. 66, no. 4, pp. 1349–1362, Apr. 2018.

J3 N. Zhang, **M. Noor-A-Rahim**, B. Vellambi, and K. Nguyen, 'Anytime characteristics of protograph-based LDPC convolutional codes', *IEEE Transactions on Communications*, vol. 64, no. 10, pp. 4057–4069, Oct. 2016.

J2 **M. Noor-A-Rahim**, K. Nguyen, and G. Lechner, 'Delay-universal codes for multiple access channels', *Transactions on Emerging Telecommunications Technologies*, vol. 27, no. 4, pp. 612–619, Apr. 2016.

J1 ——, 'Anytime reliability of spatially coupled codes', *IEEE Transactions on Communications*, vol. 63, no. 4, pp. 1069–1080, Apr. 2015.

Conference Proceedings

C15 D. Li, Y. Wang, Y. Xiaoxi, **M. Noor-A-Rahim**, Y. Guan, and S. Ping, 'Joint source channel anytime coding', in *IEEE GLOBECOM*, Dec. 2020.

C14 Y. Wang, **M. Noor-A-Rahim**, Erry Gunawan, Y. Guan, and C. Poh, 'Thermodynamically stable dna code design using a similarity significance model', in *IEEE International Symposium on Information Theory (ISIT)*, Jun. 2020.

C13 G. Ali, B. Ayalew, A. Vahidi, and **M. Noor-A-Rahim**, 'Analysis of reliabilities under different path loss models in urban/sub-urban vehicular networks', in *IEEE Vehicular Technology Conference (VTC-Fall'19)*, Sep. 2019, pp. 1–7.

C12 G. Ali, **M. Noor-A-Rahim**, A. Rahman, S. Samantha, P. Chong, and Y. Guan, 'An efficient cross-layer coding-assisted heterogeneous data access in vehicular networks', in *IEEE International Conference on Communications (ICC)*, May 2018, pp. 1–7.

C11 **M. Noor-A-Rahim** and Y. Guan, 'Spatially coupled code design for three-phase bidirectional relaying', in *IEEE International Conference on Communications (ICC)*, May 2017, pp. 1–6.

C10 **M. Noor-A-Rahim**, N. Anjum, and Y. Guan, 'Spatially coupled repeat-accumulate codes over half-duplex relay channel', in *IEEE International Conference on Communication Systems (ICCS)*, Dec. 2016, pp. 1–6.

C9 **M. Noor-A-Rahim**, G. Lechner, and K. Nguyen, 'Density evolution analysis of spatially coupled LDPC codes over BIAWGN channel', in *Australian Communications Theory Workshop (AusCTW)*, Jan. 2016, pp. 13–17.

C8 R. Mulinde, K. Nguyen, W. Cowley, and **M. Noor-A-Rahim**, 'Coding architecture for optical eU-OFDM transmission over AWGN', in *Australian Communications Theory Workshop (AusCTW)*, Jan. 2016, pp. 175–180.

C7 N. Zhang, **M. Noor-A-Rahim**, B. Vellambi, and K. Nguyen, 'Anytime properties of protograph-based repeat-accumulate codes', in *IEEE Information Theory Workshop (ITW)*, Oct. 2015, pp. 177–181.

C6 **M. Noor-A-Rahim**, K. Nguyen, and G. Lechner, 'Anytime reliable bilayer codes with uncoded relaying', in *IEEE International Conference on Communications (ICC)*, Jun. 2015, pp. 4054–4059.

C5 N. Zhang, **M. Noor-A-Rahim**, B. Vellambi, and K. Nguyen, 'Protograph-based anytime reliable channel coding design', in *IEEE International Conference on Communications (ICC)*, Jun. 2015, pp. 4048–4053.

C4 **M. Noor-A-Rahim**, K.D. Nguyen, and G. Lechner, 'Delay-exponent of bilayer anytime code', in *IEEE Information Theory Workshop (ITW)*, Nov. 2014, pp. 451–455.

C3 **M. Noor-A-Rahim**, K. Nguyen, and G. Lechner, 'Finite length analysis of LDPC codes', in *IEEE Wireless Communications and Networking Conference (WCNC)*, Apr. 2014, pp. 206–211.

C2 **M. Noor-A-Rahim**, K. Nguyen, and G. Lechner, 'Anytime spatially coupled codes for relay channel', in *Australian Communication Theory Workshop (AusCTW)*, Feb. 2014, pp. 39–44.

C1 **M. Noor-A-Rahim**, K. Nguyen, and G. Lechner, 'Anytime characteristics of spatially coupled code', in *51st Annual Allerton Conference on Communication, Control, and Computing (Allerton)*, Oct. 2013, pp. 335–341.

Honors and Awards

2018 — **Marie Skłodowska-Curie Co-funded EDGE Postdoctoral Fellowship**, Ireland, Funding: H2020 (€129,185).

2015 — **Michael Miller Medal**, University of South Australia, for the most outstanding PhD thesis in 2015 from the Institute for Telecommunications Research (ITR).

— **Top-up Scholarship**, University of South Australia.

2012–2015 — **Institute for Telecommunications Research Scholarship**, University of South Australia.

— **University President's Scholarships**, University of South Australia.

2005–2008 — **Technical Scholarship**, Khulna University of Engineering & Technology for outstanding academic performance in Undergraduate level.

2006–2008 — **Dean's Honour List**, Khulna University of Engineering & Technology.

Research Experience and Selected Project Works

Dec. 2020 – Present — **Wireless Production Line:** Modelling and performance analysis of 5G New Radio technology in industrial environment.

Dec. 2018 – Nov. 2020 — **RAHVANET:** Resource Allocation in Heterogeneous Vehicular Networks for High Speed and Highly Reliable Data Dissemination.

Jan. 2018 – Present — **DNA Based Data Storage:** High performance mapping and error correction code design for DNA based data storage.

Apr. 2016 – Nov. 2018 — **NTU-NXP Smart Mobility Testbed:** Throughput enhancement of Vehicle-to-everything (V2X) communication and efficient non-safety data dissemination.

June. 2017 – Nov. 2018 — **Ultrasonic Positioning System:** Chirp waveform design and optimization for multiple access enabled ultrasonic positioning system.

Mar. 2012 – Nov. 2015 — **Reliable Transmission for Wireless Control:** Error correction code design and analysis for wireless control application.

Mar. 2008 – Mar. 2009 — **Undergraduate Thesis:** Study and performance analysis of MIMO-OFDM system over different channel conditions.

Research Experience and Selected Project Works (continued)

July 2007 – Dec. 2007
- **Undergraduate Project:** Development of a software based electronic automation system by employing automation on client reception, controlling appliances and monitoring security. This work was featured on two national newspapers of Bangladesh.

Teaching and Advising Experience

Jun 2020 - Present
- PhD thesis co-supervision, School of Computer Science & IT, University College Cork, Ireland.
  Topic: Intelligent communication design for formation control in industrial IoT.
  Student: Leila Sadhegi

Sept 2019 - Present
- PhD thesis co-supervision, School of Computer Science & IT, University College Cork, Ireland.
  Topic: Event-driven control over unreliable wireless network.
  Student: Zohaib Ijaz

Jan 2019 - Present
- PhD thesis co-supervision, School of EEE, Nanyang Technological University, Singapore.
  Topic: Reliable and real-time codes for time critical control applications.
  Student: Yu Xiaoxi

Nov 2017 - Mar 2022
- PhD thesis co-supervision, School of EEE, Nanyang Technological University, Singapore.
  Topic: Mapping and coding for DNA based data storage.
  Student: Wang Yixin

Fall, 2020
- Lecturer: Internet Computing, School of Computer Science & IT, University College Cork, Ireland.

Fall, 2015
- Lab Instructor: Software Development with C++ (practicals), School of ITMS, University of South Australia (UniSA), Australia.

Fall, 2013
- Tutor: Mobile Communications Fundamentals (tutorials), School of ITMS, University of South Australia (UniSA), Australia.

Spring, 2010–2011
- Lecturer & Lab Instructor: Digital Electronics & Logic Circuits (classes & practicals), Dept. of ECE, Khulna University of Engineering & Technology, Bangladesh.
- Lecturer: Control System Engineering (classes), Dept. of ECE, Khulna University of Engineering & Technology, Bangladesh.

Fall, 2009–2011
- Lecturer: Wireless Networks (classes), Dept. of ECE, Khulna University of Engineering & Technology, Bangladesh.

2009–2011
- Undergraduate Project Advisor, Dept. of ECE, Khulna University of Engineering & Technology, Bangladesh.

Professional Services

- Editor of book entitled "Vehicular Ad-Hoc Networks: Applications and Technology" by Nova Science Publishers, 2020. https://novapublishers.com/shop/vehicular-ad-hoc-networks-applications-and-technology/
- Guest Editor: Special Issue "Vehicular Networks and Sustainability", MDPI Sustainability, 2020.
- Workshop Co-Organizer: New Advances on Vehicle-to-Everything (V2X) Communications and Networking, IEEE ANTS 2020.

Professional Services (continued)

- Technical reviewer of IEEE Transactions on Industrial Informatics, IEEE Transactions on Vehicular Technology, IEEE Transactions on Communications, IEEE Access, IEEE Transactions on Mobile Computing, IEEE Communications Letters, IEEE Wireless Communications Letters, Elsevier Ad Hoc Networks, Elsevier Computer Communications, MDPI Sensors.

Technical Skills

Programming Languages	MATLAB, Python, C++
VANET Simulator	NS3, VISSIM
Machine Learning Tools	TensorFlow

References

Dr. Peter Chong
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