Md Ashiqur Rahman

Researcher · Problem Solver · Mentor

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Education

Ph.D. Candidate, Computer Science (GPA: 3.75/4.00)   *Aug 2016 - May 2022*
The University of Arizona, Tucson, AZ, USA
Dissertation topic: Data-centric Wireless Networks.

Master of Science in Computer Science (GPA: 3.75/4.00)   *Aug 2016 - May 2020*
The University of Arizona, Tucson, AZ, USA

Bachelor of Science in Computer Science and Engineering (GPA: 3.60/4.00)   *Feb 2011 - May 2015*
Khulna University of Engineering & Technology (KUET), Khulna, Bangladesh
Earned Dean's List award for academic year of 2014

Skills

Research	Internet Architecture, Information-Centric Networking (ICN) with Named Data Networking (NDN), Probabilistic routing, Protocol design and performance optimization in wireless networks, Scheduling algorithms with network coding in RSU-based VANETs.
Coding & Tools	**C/C++** ; familiar with Scala, Python, Java ; Shell scripting, Lucene, GDB, Docker, Jenkins, NS-3, CSIM.
Topics	Computer Networks, Database Systems, Operating Systems, Information Retrieval, Algorithms, Data Structures, Object-oriented Design.
Others	Teaching, Project management.

Experience (Research)

Graduate Research Associate (Ph.D. advisor: Dr. Beichuan Zhang)   *Aug 2016 - Present*
Network Research Lab, Computer Science, The University of Arizona, Tucson, AZ, USA
- Studying NDN as a Future Internet Architecture and optimizing data-centric approach in wireless networks.
- Architectural differences between NDN and IP in mobile ad-hoc networks
- Performance optimization and NDN protocol design at the transport, network, and link layers in wireless networks.
- Analyzing application challenges and designing optimization techniques for NDN in Delay-tolerant Networks (DTN).

Undergraduate Researcher (Thesis advisor: Dr. G.G. Nawaz Ali)   *Apr 2014 - May 2015*
Computer Science and Engineering, Khulna University of Engineering & Technology (KUET),
Khulna, Bangladesh
- Studying applications of Network Coding in scheduling algorithms for Vehicular Ad-hoc Networks (V2I).
- Minimize wireless broadcast and Vehicle-to-RSU latency for better road-safety and infotainment.
  - Optimizing scheduling in multi-item query applications.
  - Designing passive cache-transfer policy in multi-RSU environment.
  - Optimizing maximal clique finding with dynamic threshold in heterogeneous data access.

Experience (Teaching)

Graduate Teaching Associate (Grading, Project management, discussion)   *Aug 2016 - Present*
Computer Science, The University of Arizona, Tucson, AZ, USA
- CSC 452 Operating Systems: Fall 2019, 2020, 2021.
- CSC 425 Computer Networks: Spring 2017, 2020, 2021, Fall 2017.
- CSC 477/577 Introduction to Computer Vision: Fall 2016.

Summer Instructor   *Jun - Aug (2020-21)*
Computer Science, The University of Arizona, Tucson, AZ, USA
- **2021:** CSC 352 Systems Programming and UNIX,
    - Teaching basics of C programming, FILE I/O, memory management, UNIX commands, and Shell scripting.
- **2020:** CSC 210 Software Development,
    - Teaching fundamentals of algorithms, data structures, design, and unit-testing using Java.

Lecturer   *Sep 2015 - Jul 2016*
Computer Science and Engineering, Daffodil International University (DIU), Dhaka, Bangladesh
- CSE 221/222 Algorithms (Fall 2015, Spring 2016),
    - Searching, sorting, basic graphs traversal and dynamic programming.
- CSE 134/135 Data Structures (Fall 2015, Spring-Summer 2016),
    - Covered fundamental structures such as arrays, linked-lists, trees, heaps, hash-maps.
- CSE 122/123 Programming and Problem Solving (Fall 2015, Spring-Summer 2016),
    - C programming, solving ad-hoc problems with basic data types, arrays, strings.
- CSE 334 Wireless Programming (Fall 2015, Spring 2016),
    - Designing and implementing graphics logic with Unity for mobile applications.
- CSE 332 Software Engineering (Summer 2016),
    - Software development models, project management, testing and debugging.

Key Projects

NDN in wireless, ad-hoc, and delay-tolerant networks (C++, NS-3).   *2016 - Ongoing*
- **Application and transport layer:** Implemented a dynamic interest lifetime (DIL) protocol alongside congestion window limit to reduce data redundancy and channel contention. Achieves 16.44% more throughput than TCP-IP.
- **Network layer:** Implemented a data-centric ad hoc forwarding (DAF) strategy that reduces network latency and overhead and improves application retrieval rate. Proves that NDN is better than IP in mobile ad hoc networks.
- **Link layer:** Implemented an Interest bundling technique (BLEnD) which improves channel availability for data flow. Improves throughput by 30% than "one Interest, one data" policy.

Network Coded Data Dissemination in RSU-based Vehicular networks (C, CSIM).   *2014 - 2019*
- Minimizing wireless broadcast and Vehicle-to-RSU latency for improving road-safety and infotainment.
- Achieved significant lower latency and wireless broadcast overhead with high data-retrieval rate.

Supporting Multi-Level Annotations for Medical Literature (Python, Docker)   *Aug - Dec 2018*
- Capturing higher context information near all hot-word neighbors.
- Near-SotA performance with significantly lower model training time.

Implemented Heapfile manager, Buffer manager, B+ tree in a DBMS (C, MINIBASE).   *Aug - Dec 2017*

Software router with ARP and PWOSPF protocols for shortest path forwarding (C).   *Aug - Dec 2016*

Leadership

Organizer, 11th NDN Hackathon (Virtual)   *May 2021*

Mentor: Competitive Programming (beginner and intermediate).   *Sep 2015 - Jul 2016*
Computer Science and Engineering, DIU, Dhaka, Bangladesh
- Host training sessions on technical topics for fast programming.
- Organized intra and inter-university programming contests.
  - 2015 ACM ICPC Dhaka Regional, DIU, Dhaka, Bangladesh.
  - 2016 National Girls Programming Contest (NGPC), DIU, Dhaka, Bangladesh.

Workshop Manager and Instructor   *Feb 2012 - Apr 2015*
SGIPC (Special Group of Interest in Programming Contests), KUET, Khulna, Bangladesh
- Host workshop sessions on technical topics for ACM ICPC participation.
- Organized intra and inter-university programming contests.
  - 2012 GPIT CSE Festival Programming Contest, KUET, Khulna, Bangladesh.

Chair, Workshop Manager and Instructor   *Feb 2014 - Apr 2015*
IEEE Student Branch, KUET, Khulna, Bangladesh
- Organize workshops, manage funding and student outreach program.
- Instructor of workshop on Introduction to Python (2014).

Chair, Microsoft Student Campus Representative   *Aug 2014 - Apr 2015*
Microsoft Student, KUET, Khulna, Bangladesh
- Organize workshops, instructor, manage microsoft campus student accounts.
- Instructor of Introduction to Building Windows Phone Applications with Visual Studio (2014).

Extracurricular

Member, DREAM: A voluntary blood donation society.   *Feb 2011 - May 2015*
KUET, Khulna, Bangladesh

Member, IEEE Student Branch, KUET   *Aug 2012 - May 2015*
KUET, Khulna, Bangladesh

Member, Microsoft Student Campus Representative   *Feb 2012 - May 2015*
KUET, Khulna, Bangladesh

Member, Association for Computing Machinery (ACM)   *Nov 2013 - Oct 2015*
KUET, Khulna, Bangladesh

Member, KUETPS: KUET Photographic Society   *Feb 2011 - Jun 2013*
KUET, Khulna, Bangladesh

Honors & Awards

May 2021	**Winner**, 11th NDN Hackathon	*Virtual*
Mar 2019	**2nd Runners-up**, 8th NDN Hackathon at University of California, Los Angeles	*LA, CA, U.S.A*
May 2018	**Winner**, 6th NDN Hackathon at Florida International University	*Miami, FL, U.S.A*
Mar 2017	**Winner**, 4th NDN Hackathon at University of Memphis	*Memphis, TN, U.S.A*
Sep 2015	**Best Research Poster Award**, University Day Poster Competition, KUET	*Khulna, Bangladesh*
Dec 2014	**Position 75**, ACM ICPC 2014 Asia Regional Dhaka Site	*Dhaka, Bangladesh*
Jul 2014	**Position 24**, IUT 6th National ICT Fest 2014 Programming Contest	*Dhaka, Bangladesh*
Jun 2012	**2nd Runner-up**, GPIT CSE Festival 2012 Programming Contest, KUET	*Khulna, Bangladesh*

Presentations

On Data-centric Forwarding in Mobile Ad-hoc Networks: Baseline Design and Simulation Analysis
30th International Conference on Computer Communications and Networks (ICCCN), *Athens, Greece*, *Jul 2021*.

NB-Cache: Non-Blocking In-Network Caching for High-Speed Content Routers
IEEE/ACM International Symposium on Quality of Service (IWQoS), *Phoenix, AZ, USA*, *Jun 2019*.

On Accessing Heterogeneous Data Items Using Network Coding in Wireless Broadcast
University Day Poster Competition, KUET, *Khulna, Bangladesh*, *Sep 2015*.

Publications

BLEnD: Improving NDN Performance Over Wireless Links Using Interest Bundling
2021 Military Communications Conference (MILCOM) [Accepted], *San Diego, CA, USA*, *Nov - Dec 2021*.
- Md Ashiqur Rahman, Beichuan Zhang

On the Analysis of Adaptive-Rate Applications in Data-Centric Wireless Ad-Hoc Networks
2021 IEEE 46th Conference on Local Computer Networks (LCN), *Edmonton, Canada*, *Oct 2021*.
- Md Ashiqur Rahman, Beichuan Zhang

On Data-centric Forwarding in Mobile Ad-hoc Networks: Baseline Design and Simulation Analysis
30th International Conference on Computer Communications and Networks (ICCCN), *Athens, Greece*, *Jul 2021*.
- Md Ashiqur Rahman, Beichuan Zhang

Enabling Named Data Networking Forwarder to Work Out-of-the-box at Edge Networks
2020 IEEE International Conference on Communications Workshops (ICC Workshops), *Virtual*, *Jun 2020*.
- Teng Liang, Ju Pan, Md Ashiqur Rahman, Junxiao Shi, Davide Pesavento, Alexander Afanasyev, Beichuan Zhang

Cooperative Cache Transfer-based On-demand Network Coded Broadcast in Vehicular Networks
ACM Transaction on Embedded Computing Systems, *ACM*, *May 2019*.
- G. G. MD. Nawaz Ali, MD. Noor-A-Rahim, Md. Ashiqur Rahman, Beshah Ayalew, Peter H. J. Chong, Yong Liang Guan

An Efficient Cross-layer Coding-assisted Heterogeneous Data Access in Vehicular Networks
2018 IEEE International Conference on Communications (ICC), *Kansas City, MO, USA*, *May 2018*.
- GGM Nawaz Ali, Md Noor-A-Rahim, Md A Rahman, Syeda Khairunnesa Samantha, Peter HJ Chong, Yong Liang Guan

Efficient Real-time Coding-assisted Heterogeneous Data Access in Vehicular Networks
IEEE Internet of Things Journal, *IEEE*, *Apr 2018*.
- G. G. Md. Nawaz Ali, Md. Noor-A-Rahim, Md. Ashiqur Rahman, Syeda Khairunnesa Samantha, Peter Han Joo Chong, Yong Liang Guan

Efficient coding based heterogeneous data access in vehicular networks
2017 IEEE International Conference on Communications (ICC), *Paris, France*, *May 2017*.
- G. G. M. Nawaz Ali, Md. A. Rahman, S. K. Samantha, Yumeng Gao, Peter H.J. Chong, Y. L. Guan

On Accessing Heterogeneous Data Items Using Network Coding in Wireless Broadcast
2016 IEEE 84th Vehicular Technology Conference (VTC-Fall), *Montreal, QC, Canada*, *Sep 2016*.
- Md. Ashiqur Rahman, G. G. Md. Nawaz Ali, Yumeng Gao, Syeda K. Samantha, Peter H. J. Chong

On Scheduling Real-Time Multi-item Query with Network Coding in Multi-RSU VANETs
2016 IEEE 22nd Intl. Conf. on Embedded and Real-Time Computing Systems and Applications (RTCSA), *Daegu, S. Korea*, *Aug 2016*.
- Md. A. Rahman, G.G.M. Nawaz Ali, Peter H.J. Chong, S.K. Samantha, M.F. Muntasir, C. Chen

On Efficient Data Dissemination Using Network Coding in Multi-RSU VANETs
2016 IEEE 83rd Vehicular Technology Conference (VTC Spring), *Nanjing, China*, *May 2016*.
- G. G. Md. Nawaz Ali, Md. Ashiqur Rahman, Peter Han Joo Chong, Syeda Khairunnesa Samantha