

REHMAT ULLAH

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Current Association: [Broadband Convergence Network Laboratory](#), Department of Electronics and Computer Engineering, Hongik University, South Korea

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RESEARCH INTERESTS

Named Data Networking, Edge Computing, Internet of Things, and Future Networks.

"I treat latency as a first-class citizen in my research"

EDUCATION

PhD	Electronics and Computer Engineering Hongik University, Republic of Korea	2016 – Present <i>Expected defense date: Dec 2019</i>
MS	Computer Science COMSATS University Islamabad, Islamabad, Pakistan	2014 - 2016
BS	Computer Science University: COMSATS University Islamabad, Attock, Pakistan	2009 - 2013

HONORS AND AWARDS

- [The Most Usefull Tool Award](#) *Sep. 7-8, 2019*
Awarded by Named Data Networking Team at the 9th NDN Hackathon
- [ACM SIGCOMM Travel Grant \(\\$9,00\)](#) *Aug. 18-25, 2019*
Awarded by ACM SIGCOMM for the conference ACM SIGCOMM 2019, Beijing, China
- [NSF Student Travel Grant \(\\$960\)](#) *Feb. 27-28, 2019*
Awarded by NSF for the ACM HotMobile 2019, Santa Cruz, California, USA
- 2nd runner up position in Hackathon at ACM SIGCOMM *Aug. 25, 2018*
Arranged by SIGCOMM at Nokia Skypark, Budapest, Hungary
- [ACM SIGCOMM Travel Grant \(\\$15,00\)](#) *Aug. 20-24, 2018*
Awarded by ACM SIGCOMM for the conference ACM SIGCOMM 2018, Budapest, Hungary
- [Best Paper Award](#) *Jan. 31- Feb. 2, 2018*
Awarded at the Sixth International Conference on Green and Human Information Technology, Chiang Mai, Thailand

- [ACM SIGCOMM Geodiversity Travel Grant \(\\$3,000\)](#) Sep. 26-28, 2017
Awarded by ACM for the conference ACM ICN 2017, Berlin, Germany
- [2nd position](#) 2010
Awarded by COMSATS University Islamabad, Attock, Pakistan.
- [Global Scholarship for Ph.D.](#) 2016-2018
Awarded by Hongik University, Republic of Korea, for Doctorate Degree in Computer Engineering.
- KP Government Scholarship for BS in Computer Science 2009-2013
Awarded by the Government of Khyber Pakhtunkhwa, Pakistan that offers fully funded 4-year undergraduate degree scholarships to talented students of District D.I. Khan and District Tank, Pakistan with the objective to develop human resource capacity in different fields.

PUBLICATIONS

Journal Papers (SCI/SCIE)

1. Muhammad Atif Ur Rehman, Dong-Hak Kim, Kyungmee Choi, [Rehmat Ullah](#), and Byung Seo Kim, “A Statistical Performance Analysis of Named Data Ultra Dense Networks,” in *Applied Sciences*, vol. 09, no. 18, pp. 1-18. (Impact Factor=2.217)
2. [Rehmat Ullah](#), Muhammad Atif Ur Rehman, and Byung Seo Kim, “Hierarchical Name-Based Mechanism for Push-Data Broadcast Control in Information-Centric Multihop Wireless Networks,” in *Sensors*, vol. 19, no. 14, pp. 1-18, 2019. (Impact Factor=3.031)
3. Muhammad Atif Ur Rehman, [Rehmat Ullah](#), and Byung Seo Kim, “NINQ: Name Integrated Query Framework for Named Data Networking of Things,” in *Sensors*, vol. 19, no. 13, pp. 1-30, 2019. (Impact Factor=3.031)
4. [Rehmat Ullah](#), Muhammad Atif Ur Rehman, and Byung Seo Kim, “Design and Implementation of an Open Source Framework and Prototype for Named Data Networking based Edge Cloud Computing System,” in *IEEE Access* 2018. doi: 10.1109/ACCESS.2019.2914067. Impact Factor= (4.098)
5. [Rehmat Ullah](#), Syed Hassan Ahmed, and Byung Seo Kim, “Information-Centric Networking with Edge Computing for IoT: Research Challenges and Future Directions,” *IEEE Access* vol. 6, pp. 73465-73488, 2018. doi: 10.1109/ACCESS.2018.2884536. Impact Factor= (4.098)
6. [Rehmat Ullah](#), and Byung Seo Kim “A Novel Parallel Processing Mechanism for Data Transmission in Wireless Content-Centric Networking” *Journal of Intelligent and Fuzzy Systems*, vol. 35, no. 6, pp. 5815-5825, 2018. doi: 10.3233/JIFS-169824. Impact Factor= (1.637)
7. Muhammad Khalil Afzal, [Rehmat Ullah](#), Byung Seo Kim and Sung Won Kim “A Reliable and Scalable Groupcast Block Acknowledgement Scheme for Video

Multicast over IEEE 802.11aa Standard” *Journal of Intelligent and Fuzzy Systems*, vol. 35, no. 6, pp. 5853-5865, 2018. doi: 10.3233/JIFS-169828 Impact Factor= (1.637)

8. **Rehmat Ullah**, Yasir Faheem, and Byung Seo Kim, “Energy and Congestion-Aware Routing Metric for Smart Grid AMI Networks in Smart City,” *IEEE Access*, Volume 5, No. 1, pp.13799-13810, 2017, doi: 10.1109/ACCESS.2017.2728623. Impact Factor= (4.098)

Journal Papers (Under review)

9. Sajid Rehman Babar, Abdul Wahid, **Rehmat Ullah**, and Byung Seo Kim, “APSSR: Adaptive Packet Size Selection Based Routing Protocol for Underwater Acoustic Sensor Networks”
10. **Rehmat Ullah**, Chanmin Park, and Byung Seo Kim, “Pre-Request Method for Intermediate Nodes in Wireless CCNs”.
11. Balázs Sonkoly, Dávid Haja, Balázs Németh, Márk Szalay, János Czentye, János Dóka, Róbert Szabó, **Rehmat Ullah**, Byung-Seo Kim, and László Toka “Scalable Edge Cloud Platforms for Future IoT Applications”.

Journal Papers (work in progress)

12. **Rehmat Ullah**, Muhammad Atif Ur Rehman, Byung Seo Kim, Balázs Sonkoly, and László Toka “Design of Dynamic Pending Interest Table for Real Time Applications in Named Data Networking based Edge Cloud Computing Systems”
13. **Rehmat Ullah**, Muhammad Atif Ur Rehman and Byung Seo Kim “Towards Named Data Networking with Edge Computing for Radio Access Networks”.
14. **Rehmat Ullah**, Muhammad Atif Ur Rehman and Byung Seo Kim, “A Realization of Fog computing with Named Data Networking in Tactile Network Inspired VANETs”.
15. Muhammad Atif Ur Rehman, **Rehmat Ullah**, Yasir Faheem, and Byung Seo Kim “Design of Hierarchical Naming scheme for Cluster based Information Centric Wireless Sensor Networks”.

Conference Papers

1. **Rehmat Ullah**, Muhammad Atif Ur Rehman, Byung-Seo Kim and Balázs Sonkoly “On Pending Interest Table in Named Data Networking based Edge Computing: The Case of Mobile Augmented Reality” *In The 11th International Conference on Ubiquitous and Future Networks July 2 (Tue.) ~ July 5 (Fri.), 2019, Zagreb, Croatia.*
2. **Rehmat Ullah**, Muhammad Atif Ur Rehman and Byung-Seo Kim “RAPEL: Robust and Adaptive method for PIT Entry Lifetime in Wireless Content-Centric

- Networks” *In The 11th International Conference on Ubiquitous and Future Networks July 2 (Tue.) ~ July 5 (Fri.), 2019, Zagreb, Croatia.*
3. **Rehmat Ullah**, Muhammad Atif Ur Rehman and Byung-Seo Kim “Named Data Networking with Edge Computing for 5G Radio Access Network”, *Conference on Korean Network Operations and Management (KNOM), Daegu, Republic of Korea, May 30~May 31, 2019.*
 4. Muhammad Atif Ur Rehman, **Rehmat Ullah** and Byung-Seo Kim “Caching in Named Data Networking with an Open Source Edge Computing Framework” *Conference on Korean Network Operations and Management (KNOM), Daegu, Republic of Korea, May 30~May 31, 2019.*
 5. **Rehmat Ullah**, Muhammad Atif Ur Rehman and Byung-Seo Kim “Push-based Data Broadcast Control for Information-Centric Internet of Things” *In proceedings of International Conference on Green and Human Information Technology, Jan. 16-18, 2019, Kuala Lumpur, Malaysia.*
 6. Muhammad Atif Ur Rehman, **Rehmat Ullah** and Byung-Seo Kim “An In-Network Query Structure for Information Centric Sensor Networks” *In proceedings of International Conference on Green and Human Information Technology, Jan. 16-18, 2019, Kuala Lumpur, Malaysia.*
 7. Malik Nadeem, Khalid Awan, **Rehmat Ullah**, and Seong Oun Hwang “DoS Attack and Countermeasures in Named Data Networking” *In proceedings of International Conference on Green and Human Information Technology, Jan. 16-18, 2019, Kuala Lumpur, Malaysia.*
 8. Rana Asif Rehman, **Rehmat Ullah** and Byung-Seo Kim” Caching and Forwarding in Named Data Networking based MANETs” *Conference on Korean Network Operations and Management (KNOM), Jeju Island, Republic of Korea, May 10~May 11, 2018.*
 9. Muhammad Atif ur Rehman, **Rehmat Ullah** and Byung Seo-Kim “Naming Schemes in Information-Centric Networking” *Conference on Korean Network Operations and Management (KNOM), Jeju Island, Republic of Korea, May 10~May 11, 2018.*
 10. **Rehmat Ullah**, Hyundoo Jin and Byung Seo Kim “A Novel Method for Delay Mitigation in Content- Centric Networking- based Wireless Networks”, *International Conference on Green and Human Information Technology, Chiang Mai, Thailand, January 31, 2017~ February 2, 2018.*
 11. Muhammad Khalil Afzal, **Rehmat Ullah**, Byung Seo Kim and Sung Won Kim “A Reliable and Scalable Groupcast Block Acknowledgement Scheme for Video

- Multicast over IEEE 802.11aa Standard”, *International Conference on Green and Human Information Technology, Chiang Mai, Thailand, January 31, 2017 ~ February 2, 2018.*
12. **Rehmat Ullah**, Tran Dinh Hieu, and Byung-Seo Kim “A Multi-Metric Routing Protocol for Low-Power and Lossy Networks” *KICS Conference, PyeongChang, Republic of Korea, January 18~20, 2017,*
 13. Sung-Hoon Mah, Hong-Min Bae, **Rehmat Ullah**, and Byung-Seo Kim “A Study on the Smart Home focused on the change of Housing Space” *General Meeting & Annual Autumn Conference, Daegu, Republic of Korea, Nov25 ~ 26, 2016.*
 14. Naveed Ilyas, Mariam Akbar, **Rehmat Ullah**, et al., “SEdG: Scalable and Efficient Data Gathering Routing Protocol for Underwater WSNs”, *6th International Conference on Ambient Systems, Networks and Technologies (ANT-2015), London, UK, June 2-5, 2015.*
 15. Sheeraz Ahmed, Mariam Akbar, **Rehmat Ullah**, et al., “ARCUN: Analytical approach towards Reliability with Cooperation for Underwater WSNs”, *6th International Conference on Ambient Systems, Networks and Technologies (ANT-2015), London, UK, June 2-5, 2015.*

Posters:

1. Muhammad Atif Ur Rehman, **Rehmat Ullah**, and Byung-Seo Kim “A Compact NDN Architecture for Cluster based Information Centric Wireless Sensor Networks” *Accepted in 6th ACM Conference on Information-Centric Networking, 2019, Macau, China.*
2. Donghak Kim, **Rehmat Ullah**, and Byung-Seo Kim, “RSP Consensus Algorithm for Blockchain” *The 20th Aisa-Pacific Network Operations and Management Symposium, September 18-20, 2019, Matsue, Japan.*
3. **Rehmat Ullah**, Muhammad Atif Ur Rehman and Byung-Seo Kim “A Testbed implementation of NDN based Edge Computing for Mobile Augmented Reality” *In Proceedings of the 20th International Workshop on Mobile Computing Systems and Applications (HotMobile '19). ACM, New York, NY, USA, 181-181. doi: <https://doi.org/10.1145/3301293.3309565> (NSF Student Travel Grant)*
4. **Rehmat Ullah**, Byung- Seo Kim “Named Data Networking in Edge Computing” *NDNComm, 19-20 September 2018, NIST, Washington D.C, USA.*

5. Muhammad Atif Ur Rehman, [Rehmat Ullah](#) and Byung-Seo Kim” Named Query Framework for Named Data Networking of Things” *NDNComm, 19-20 September 2018, NIST, Washington D.C, USA.*

Open Source Project Contribution

1. NDN-Mailing -List-Search App”, 9th Named Data Networking Hackathon
Code: <https://github.com/9th-ndn-hackathon/NDN-Mailing-List-Search-App>
2. “Prototype Implementation of NDN based Edge Computing System”.
Code: <https://github.com/atifrehman/NEC> OR <https://github.com/Rehmatkhan/NEC>
3. “NEC: An Open Source Framework for Name Data Networking, Edge Computing, and Cloud Computing”, *ACM SIGCOMM, Hackathon Skypark, Nokia, Budapest, Hungary, August 25, 2018.*
Code: <https://github.com/acmsigcomm18hackathon/hackathonprojects/wiki>
(ACM SIGCOMM Student Travel Grant)

ACTIVE PROJECTS I AM INVOLVED IN AS A GRADUATE STUDENT

1. Research on Augmented Reality Framework using Future Internet Paradigms for 5G & Beyond” (Korea-Hungary Joint Research Program): 2019.01 ~ 2020.12
Role: Team Leader, Responsibilities: Writing Project Proposal, Research Papers, Reports, etc.
2. Research on Information Centric Wireless Edge Networking (ICWEN) Technology for High Reliability and Low Delay Communications” (Mid-career Researcher Program, National Research Foundation of Korea): 2018.03 ~ 2021.02
Role: Team Leader, Responsibilities: Writing Project Proposals, Research Papers, Reports, etc.

INVITED TALKS & PRESENTATIONS

1. **[Invited]** “Wireless ICN with Edge Computing for 5G and Beyond”
Venue: Budapest University of Technology and Economics (BME), Building “P”, Science Park, Budapest Hungary, July 1, 2019.
2. **[Invited]** Wireless Information Centric Networking for Edge Networking,
Venue: Information Security and Machine Learning Lab, Hongik University, Sejong Campus, Republic of Korea, January 7, 2019.
3. “RAPEL: Robust and Adaptive Method for PIT Entry Lifetime in Wireless Content-Centric Networks” *The eleventh International Conference on Ubiquitous and Future Networks, Zagreb, Croatia, July 3, 2019.*
4. “An Open Source Framework for Name Data Networking (NDN), Edge Computing, and Cloud Computing”, Nokia Bell Labs, Budapest, Hungary, August 25, 2018.

5. “Caching and Forwarding in Named Data Networking based MANETs”
Conference on Korean Network Operations and Management (KNOM), Jeju Island, Republic of Korea, May 10~May 11, 2018.
6. “A Novel Method for Delay Mitigation in Content- Centric Networking- based Wireless Networks”, *International Conference on Green and Human Information Technology*, Chiang Mai, Thailand, January 31, 2017~ February 2, 2018.
7. “A Reliable and Scalable Groupcast Block Acknowledgement Scheme for Video Multicast over IEEE 802.11aa Standard”, *International Conference on Green and Human Information Technology*, Chiang Mai, Thailand, January 31, 2017 ~ February 2, 2018.
8. “A Multi-Metric Routing Protocol for Low-Power and Lossy Networks” *KICS Conference*, PyeongChang, Republic of Korea, January 18~20, 2017.

PROFESSIONAL MEMBERSHIP

- Association for Computing Machinery (ACM), Student Member Since 2017

PROFESSIONAL SERVICES

Reviewer and/or Technical Program Committee: International Conferences and Workshops

- PC member of Special Sessions: SIGCSE 2019, Minneapolis, Minnesota, USA
February 27th - March 2nd, 2019
- Shadow TPC Member: ACM Internet Measurement Conference, Boston, MA, USA
October 31 - November 2, 2018
- 1st ACM MobiHoc Workshop on Networking and Cybersecurity for Smart Cities (SmartCitySecurity 2018), Los Angeles
June 25, 2018
- IEEE Consumer Communications & Networking Conference, Las Vegas, USA
January 12-15, 2018
- 4th International Workshop: Research Advancements in Future Internet Architectures, Porto, Portugal
June 3-6, 2018
- IEEE 87th Vehicular Technology Conference: VTC2018-Spring, Porto, Portugal
June 3–6, 2018

Reviewer: International Journals

- IEEE Journal on Selected Areas in Communications *Since 2019-Present*
- IEEE Wireless Communications Magazine *Since 2018-Present*
- Transactions on Emerging Telecommunications Technologies *Since 2018-Present*
- IEEE Communications Magazine *Since 2018-Present*
- Future Generation Computer Systems *Since 2017-Present*
- IEEE Access *Since 2017-Present*

INTERNATIONAL MEETINGS (IN-PERSON AND REMOTE)

- Korea-Hungary Joint Research Project Kickoff Meeting at Budapest University of Technology and Economics (BME), Building “I”, Science Park, Budapest Hungary.
July 1, 2019

- [Shadow Technical Program Committee](#) remote meeting of ACM Internet Measurement Conference, Boston, MA, USA *July 20, 2018*
- [RIOT Summit 2017](#), Second F2F Meeting of the RIOT Community, at Berlin Germany *September 25-26, 2017*

COMMUNITY SERVICES

- **Joint Secretary (North):** Pakistan Students and Scholars Association South Korea (PSAK), April 2019-April 2020.
- **Regional Secretary (North):** Pakistan Students and Scholars Association South Korea (PSAK), May 2018-April 2019.
- **University Coordinator:** Hongik University, Republic of Korea, May 2018-Present.

PROFESSIONAL CERTIFICATION/TRAINING

CISCO Certified and Network Associate (C.C.N.A.), COMSATS University, 2010

Completed Modules:

- CCNA Discovery: Introducing Routing and Switching in the Enterprise.
- CCNA Discovery: Designing and Supporting Computer Networks
- CCNA Discovery: Networking for Home and Small Businesses
- CCNA Discovery: Working at a Small-to-Medium Business or ISP

MAJOR SKILLS

- **Programming:** C/C++, C#, ASP.NET, R, SQL, MongoDB
- **Software(s):** MATLAB, Latex, Visual Studio, SQL Server Management Studio
- **Simulators:** NS3, ndnSIM, Cooja, CCNLite, Wireshark, Packet Tracer

TEACHING EXPERIENCE

Hongik University, Republic of Korea

March 2017 – Present

Graduate Teaching Assistant, Computer & Information Communication Engineering Department

Assisted providing in the following courses:

- Advance Wireless Communication
- Data Structures and Algorithms
- Introduction to Computer and Programing
- Object Oriented Programing

Iqra University, Islamabad, Pakistan

Sep 2015 – Feb 20, 2016

Lab Engineer, Computer Science Department

Taught Undergraduate Courses:

- Data Communications and Networking
- Data Structures and Algorithms
- Introduction to Computer and Programing
- Object Oriented Programing

Grafton College (NUML University), Islamabad, Pakistan
Visiting Lecturer, Software Engineering Department

Feb 2015 - Aug 2015

Taught Undergraduate Courses:

- Data Base Systems
- Algorithm Analysis
- Object Oriented Programing

Global Learning Academy, Islamabad, Pakistan

Aug 2014 - Jan 2015

Instructor:

Taught Intermediate of Computer Sciences (ICS) Courses:

- Introduction to Computer and Programing
- Operating System

Peshawar Institute of Technology, Peshawar, Pakistan

Aug 2013 - Jan 2014

Lecturer:

Taught Diploma of Associate Engineer (DAE) Courses:

- Basic IT Skills
- Computer Applications

REFERENCES

Dr. Byung-Seo Kim, [Associate Professor]

Department of Software & Communication Engineering

Hongik University, South Korea

Email: jsnbs@hongik.ac.kr

Dr. Yasir Faheem, [Assistant Professor]

Department of Computer Science

COMSATS University Islamabad, Pakistan

Email: yasir.faheem@comsats.edu.pk

Dr. Syed Hassan Ahmad, [Assistant Professor]

Department of Computer Science

Georgia Southern University, Statesboro, USA

Email: sh.ahmed@ieee.org