University Academic Curriculum Vitae

Personal Information

Name: Muhammad Azfar YAQUB
Office: +39 0471 017219
Emails: MuhammadAzfar.Yaqub@unibz.it

Education since leaving school

- 2019, PhD in Computer Science and Engineering, Kyungpook National University, South Korea
- 2010, MSc in Mobile Broadband Communication, Lancaster University, UK
- 2007, BS in Electrical (Telecommunication) Engineering, COMSATS Institute of Information Technology, Pakistan

Present appointment

- Feb 2023 – till date: **Assistant Professor** (Researchers with a fixed- term contract RTDa) in Data Communication and Computer Networks (*scientific sector: ING-INF/05 section 09/H1*)
- Supervisor: Prof. Antonio Liotta, Free University of Bozen-Bolzano, Italy
- Research: Vehicular Communications, Information Centric Networking, Internet of Things, Connected and Smart Communities, miniaturized Machine learning.

Professional experience

From / to	Job title	Name of academic Institution	Responsibilities
2023-till date	Assistant Professor (RTDa)	Free University of Bozen-Bolzano, Italy	Teaching UG courses, research and project management.
2021-2023	Assistant Professor	COMSATS University Islamabad, Islamabad Pakistan	Teaching, Curriculum review committee Member
2008-2021	Lecturer	COMSATS University Islamabad, Islamabad Pakistan	Teaching, Curriculum review committee Member
2014-2019	Research Assistant	Kyungpook National University, South Korea	Research and assistance in courses

Participation in exhibitions (where applicable)

- SIGAPP Student Travel Award Program (STAP) for paper presentation at the 33rd ACM SAC Conference, April 9-13, 2018, Pau, France

Experience in academic teaching

- Assistant Professor at COMSATS University Islamabad, Islamabad Pakistan
  - Under-graduate courses: Digital Logic Design (Fall 2019), Engineering Professionalism (Spring 2020, 2021, 2022), Artificial Engineering (Fall 2020, 2021).
  - Post-Grad/PhD: Wireless Networks (Fall 2020, 2021)
- Teaching Assistant at Kyungpook National University, Daegu South Korea
  - Post-graduate course: Design and Analysis of Computer Networks. (Fall 2017)
  - Under-graduate course: SW Practical English (Spring 2017)

Other academic responibilities

- Guest Editor, MDPI Electronics journal, SI on Future Networks: New Advances and Challenges Vol 2
- Guest Editor, MDPI Electronics journal, SI on Future Networks: New Advances and Challenges Vol 1
- Guest Editor, MDPI Sensors journal, SI on Recent Advances in Internet of Things and Sensor Networks
- Publicity Chair, WCN track in ACM SAC (2018~2020)
- Reviewer/TPC member for several reputed IEEE/Elsevier journals and conferences. (Incomplete list)
    - IEEE Communication Magazine, IEEE ACCESS, IEEE Transactions on Industrial Informatics, Elsevier Computer Networks, Elsevier Vehicular Communications.
    - IEEE TSP, IEEE INFOCOM, IEEE GLOBECOM, IEEE ICC, IEEE CCNC, ACM SAC, ACM RACS.
- Member Electrical Engineering program accreditation committee, COMSATS University Islamabad, Pakistan (Fall 2011 – Spring 2014)
- Undergraduate program coordinator, BS EE at COMSATS University Islamabad, Pakistan (Spring 2013)
- Member, Curriculum review committee, COMSATS University Islamabad, Pakistan (Spring 2013 – Fall 2013)
- Undergraduate program coordinator, BS EE at COMSATS University Islamabad, Pakistan (Fall 2011-Spring 2012)
- Member organizing committee, COMSATS Engineering Project Exhibition (CEPEX 2011) COMSATS University Islamabad, Pakistan (April 13-14, 2011)

Memberships

- Institute of Electrical and Electronics Engineers (IEEE)
- IEEE Young Professionals Society
- IEEE Communication Society
- Pakistan Engineering Council (PEC # ELECT/23571)

Research and scholarships

Date granted	Award Holder(s)	Funding Body	Title	Amount received
08.2021 – 01.2023	**Muhammad Azfar Yaqub**	National Electronics Complex of Pakistan/ COMSATS University Islamabad	Exploration and Designing of Routing Algorithm for Mesh Modems	-
10.2016 – 07.2019	- **Muhammad Azfar Yaqub** - Muhammad Toaha Raza Khan - Junho Seo - Minseok Kim - Dongkyun Kim	Kyungpook National University, South Korea	Development underwater sensor network IoT technology to provide virtual research industry network	₩24,375,000
01.2015 - 12.2016	- **Muhammad Azfar Yaqub** - Sungwon Lee - Syed Hassan Ahmed - Minseok Kim - Dongkyun Kim	Kyungpook National University, South Korea	AUTOSAR-based vehicle internal and external communication platform and application technology for smart vehicle	₩24,161,260
01.2015 –	- **Muhammad**	Kyungpook National	Adaptive Scheduling and	₩1,100,000

04.2015	**Azfar Yaqub** - Sunghyun Kim - Syed Hassan Ahmed - Gwanghyun Kim - Dongkyun Kim	University, South Korea	Medium Access Control Techniques for Beacon Transmission for Application Level QoS Improvement in Vehicular Ad Hoc Networks	
09.2014 – 08.2018	**Muhammad Azfar Yaqub**	Kyungpook National University, South Korea	Brain Korea (BK) Scholarship for pursuance of PhD studies	₩71,200,000
09.2014 - 08.2016	**Muhammad Azfar Yaqub**	Kyungpook National University, South Korea	KNU International Graduate Scholarships (KINGS) for pursuance of PhD studies	₩11,670,500
10.2009 - 09.2010	**Muhammad Azfar Yaqub**	Comsats University Islamabad, Pakistan	Merit Scholarship for MSc in Mobile Broadband Communication at Lancaster University, UK	£ 21,200

Publications

BOOK CHAPTER

1. *Muhammad Azfar Yaqub, S.H. Ahmed, S.H. Bouk and D. Kim*, "**Information-Centric Networks (ICN)**", Springer Briefs in Electrical and Computer Engineering. Springer, Singapore, March 2016. DOI: https://doi.org/10.1007/978-981-10-0066-9_2

JOURNAL ARTICALS

1. *Adnan Fida, Adnan Ifthikhar, Muhammad Azfar Yaqub, and Dongkyun Kim,* **"Coordinated Throughput Optimization for Mobile Sensor Networks under Heterogeneous Fading Conditions",** Transactions on Emerging Telecommunications Technologies, 2022. [IF: 3.310] DOI: https://doi.org/10.1002/ett.4096
2. *Muhammad Azfar Yaqub, Syed Hassan Ahmed, and Dongkyun Kim,* **"An Improved Push-based Protocol for Critical Data Dissemination in Vehicular Named Data Networks"** Journal of Information Science and Engineering, 2020. [IF: 0.54] DOI: https://doi.org/10.6688/JISE.202007_36(4).0009
3. *Sungwon Lee, Muhammad Azfar Yaqub, Dongkyun Kim,"* **Neighbor Aware Protocols for IoT Devices in Smart Cities—Overview, Challenges and Solutions***,"* Electronics, 2020. [IF: 2.69] DOI: https://doi.org/10.3390/electronics9060902
4. **Muhammad Azfar Yaqub, S.H. Ahmed, S.H. Bouk and D. Kim,* "**Towards Energy Efficient Duty Cycling in Underwater Wireless Sensor Networks**", Multimedia Tools and Applications, 2018. [IF: 2.101] DOI: https://doi.org/10.1007/s11042-018-6924-2
5. **Muhammad Azfar Yaqub, S.H. Ahmed, and D. Kim,* "**Asking Neighbors a Favor: Cooperative Video Retrieval using Cellular Networks in VANETs**", Vehicular Communications, Vol. 12, pp. 39-49, 2018. [IF: 3.530] DOI: https://doi.org/10.1016/j.vehcom.2017.12.002
6. **S.H. Ahmed, S.H. Bouk, Muhammad Azfar Yaqub, D. Kim, and H. Song,* "**DIFS: Distributed Interest Forwarder Selection Scheme for Vehicular Named Data Networks**," IEEE Transactions on Intelligent Transportation System, vol. 19, no. 9, pp. 3076-3080, Sept. 2018. [IF: 5.744] DOI:

https://doi.org/10.1109/TITS.2017.2768329

7. *A.N. Alvi, Muhammad Azfar Yaqub, N. Javaid, S.H. Ahmed, S.H. Bouk and D. Kim,* "**An Improved IEEE 802.15.4 Superframe Structure with Minimum Delay and Maximum CFP Link Utilization,**" Ad Hoc & Sensor Wireless Networks (AHSWN), V. 35, issue 1-2, p. 151-171, 2017. [IF: 0.948] URL: https://www.oldcitypublishing.com/journals/ahswn-home/ahswn-issue-contents/ahswn-volume-35-number-1-2-2017/ahswn-35-1-2-p-151-171/
8. **S.H. Ahmed, S.H. Bouk, Muhammad Azfar Yaqub, D. Kim, H. Song, and J. Lloret,* "**CODIE: Controlled Data and Interest Evaluation in Vehicular Named Data Networks**", IEEE Transactions on Vehicular Technology, vol. 65, no. 6, pp. 3954-3963, June 2016. [IF: 5.339] DOI: https://doi.org/10.1109/TVT.2016.2558650
9. **S.H. Ahmed, Muhammad Azfar Yaqub, S.H. Bouk, and D. Kim,* "**SmartCop: Enabling Smart Traffic Violations Ticketing in Vehicular Named Data Networks**," Mobile Information Systems, vol. 2016, Article ID 1353290, 12 pages, 2016. [IF: 1.635] DOI: https://doi.org/10.1155/2016/1353290
10. *S.H. Bouk, S.H. Ahmed, Muhammad Azfar Yaqub, D. Kim and M. Gerla,* "**DPEL: Dynamic PIT Entry Lifetime in Vehicular Named Data Networks**," IEEE Communications Letters, vol. 20, no. 2, pp. 336-339, Feb. 2016. [IF: 3.457] DOI: https://doi.org/10.1109/LCOMM.2015.2508798
11. *A.N. Alvi, S.H. Bouk, S.H. Ahmed, Muhammad Azfar Yaqub, M. Sarkar, and H. Song,* "**BEST-MAC: Bitmap-assisted Efficient and Scalable TDMA based WSN MAC Protocol for Smart Cities**," IEEE Access Journal, vol. 4, pp. 312-322, 2016. [IF: 4.098] DOI: https://doi.org/10.1109/ACCESS.2016.2515096
12. **A.N. Alvi, S.H. Bouk, S.H. Ahmed, Muhammad Azfar Yaqub, N. Javaid, and D. Kim,* "**Enhanced TDMA based MAC Protocol for Adaptive Data Control in Wireless Sensor Networks**," Journal of Communications and Networks (JCN), vol. 17, no. 3, pp. 247-255, June 2015. [IF: 1.632] DOI: https://doi.org/10.1109/JCN.2015.000046

CONFERENCE PAPERS

1. *A. Rasheed, A. Anwar, KSK Liyanage, P. Chong, W. Liu, Muhammad Azfar Yaqub, and MR Jafri,* **"Application-Aware Hierarchical Offloading for MEC-Enabled Autonomous Vehicle Architecture",** IEEE Globecom, Taipei, Taiwan, 2020. https://doi.org/10.1109/GCWkshps50303.2020.9367480
2. *Abdul Rehman, Anand Paul, Muhammad Azfar Yaqub, and MMU Rathore,* **"Trustworthy intelligent industrial monitoring architecture for early event detection by exploiting social IoT,"** ACM Symposium on Applied Computing (SAC), Brno Czech Republic, April 2020. https://doi.org/10.1145/3341105.3373996
3. *Muhammad Azfar Yaqub, S.H. Ahmed, and D. Kim,* "**A Detailed Simulation Study of the Push-based Protocol for Critical Data Dissemination in Vehicular Named Data Networks**," 2019 International Conference on Networking and Network Applications, Daegu Korea, 2019. https://doi.org/10.1109/NaNA.2019.00042
4. *N. Leshov, Muhammad Azfar Yaqub, M.T.R. Khan, S. Lee, D. Kim,* "**Content Name Privacy in Tactical Named Data Networking**," IEEE ICUFN, Zagreb Croatia, 2019. https://doi.org/10.1109/ICUFN.2019.8805919
5. *M.R. Usman, M.A. Usman, Muhammad Azfar Yaqub, S.Y. Shin,* "**UAV Reconnaissance using Bio-Inspired Algorithms: Joint PSO and Penguin Search Optimization Algorithm (PeSOA) Attributes**," IEEE CCNC, Las Vegas USA, 2019. DOI: https://doi.org/10.1109/CCNC.2019.8651831
6. *Muhammad Azfar Yaqub, S.H. Ahmed, S.H. Bouk and D. Kim,* "**Enabling Critical Content Dissemination in Vehicular Named**

Data Networks," ACM RACS, Honolulu USA, 2018. DOI: https://doi.org/10.1145/3264746.3264779

7. *L. Amwine, M.T.R Khan, Muhammad Azfar Yaqub, and D. Kim,* "**RIED-MAC: Receiver-Initiated MAC based on Energy-efficient Duty Cycling for UWSNs**," IEEE OCEANS, Kobe Japan, 2018, pp. 1-5, DOI: https://doi.org/10.1109/OCEANSKOBE.2018.8559282
8. *Muhammad Azfar Yaqub, S.H. Ahmed, and D. Kim,* "**BIRD: Bio-InspiRed Distributed Interest Forwarding in Vehicular Named-Data Networks**," ACM SAC, Pau France, 2018, 2078-2083. DOI: https://doi.org/10.1145/3167132.3167355
9. *Muhammad Azfar Yaqub, M.T.R Khan, S.H. Ahmed, D. Kim,* "**Receiver-Initiated Dynamic Duty Cycle Scheduling Schemes for Underwater Wireless Sensor Networks**," IEEE CCNC, USA, 2018, pp. 1-6. doi: https://doi.org/10.1109/CCNC.2018.8319205
10. *E. Moon, S. Lee, Muhammad Azfar Yaqub, and D. Kim,* "**p-BORE: Prioritized Beacon Repetition and Contention Window Selection Based MAC Protocol in Underwater Wireless Sensor Networks**," IEEE ICUFN, Milan Italy, 2017, pp. 269-271. doi: https://doi.org/10.1109/ICUFN.2017.7993790
11. *Muhammad Azfar Yaqub, S.H. Ahmed, S.H. Bouk, and D. Kim,* "**FBR: Fleet Based video Retrieval in 3G and 4G enabled Vehicular Ad Hoc Networks**," IEEE ICC, Malaysia, 2016, pp. 1-6. doi: https://doi.org/10.1109/ICC.2016.7510894
12. *A.N. Alvi, S.H. Bouk, S.H. Ahmed, Muhammad Azfar Yaqub,* "**Influence of Backoff Period in Slotted CSMA/CA of IEEE 802.15.4**," Wired/Wireless Internet Communications (WWIC), Thessaloniki Greece, 2016. DOI: https://doi.org/10.1007/978-3-319-33936-8_4
13. *Muhammad Azfar Yaqub, S.H. Ahmed, S.H. Bouk, and D. Kim,* "**Interest Forwarding in Vehicular Information Centric Networks: A Survey**," ACM SAC, Pisa Italy, 2016. 724-729. DOI: https://doi.org/10.1145/2851613.2851857
14. *S.H. Ahmed, S.H. Bouk, Muhammad Azfar Yaqub, and D. Kim,* "**CONET: COntrolled Data Packets Propagation in Vehicular Named Data NETworks**," IEEE CCNC, USA, 2016, pp. 620-625. doi: https://doi.org/10.1109/CCNC.2016.7444850
15. *S.H. Bouk, Muhammad Azfar Yaqub, S.H. Ahmed, and D. Kim,* "**Evaluating Interest/Data Propagation in Vehicular Named Data Networks**," ACM RACS, Czech Republic, 2015, 256-259. DOI: http://dx.doi.org/10.1145/2811411.2811539
16. *S.H. Ahmed, Muhammad Azfar Yaqub, S.H. Bouk, and D. Kim,* "**Towards Content-Centric Traffic Ticketing in VANETs: An Application Perspective**," The 3rd International Workshop on Intelligent Vehicles, IEEE ICUFN, Sapporo Japan, 2015, pp. 237-239. doi: https://doi.org/10.1109/ICUFN.2015.7182541

Publications about the applicant

Nil

Further data

- 2018, Invited Talk, ACM Research on Adaptive and Convergent Systems (RACS), from October 9 - 12, 2018, in Honolulu USA.
- 2018, Invited Talk, The 33rd ACM Symposium on Applied Computing, from April 9 - 13, 2018, in Pau France.
- 2018, Invited Talk, IEEE Consumer Communications & Networking Conference (IEEE CCNC 2018), January 12 – 15, 2018 in Las Vegas, NV, USA.
- 2017, Invited Talk, The 9th International Conference on Ubiquitous and Future Networks (ICUFN), July 4-7, 2017 in Milan, Italy.
- 2016, Invited Talk, The 31st ACM Symposium on Applied Computing, from April 4 -8, 2016 in Pisa, Italy.

Entrepreneurship

Patents:

1. Inventors: Muhammad Azfar Yaqub, M.T.R. Khan, S.H. Ahmed, Y. Bae, D. Kim, Title: Next Wake-Up Time of Sender Node Based Dynamic Duty Cycle Scheduling Scheme for Underwater Wireless Sensor Networks, Publish Date: 30.10.2020, Application Number: 10-2018-0058514
   DOI: https://doi.org/10.8080/1020180058514?urlappend=en
2. Inventors: Muhammad Azfar Yaqub, M.T.R. Khan, S.H. Ahmed, H. Park, D. Kim, Title: Residual Energy-Based Receiver-Initiated Dynamic Duty Cycle Scheduling Scheme for Underwater Wireless Sensor Networks, Publish Date: 24.09.2019, Application Number: 10-2017-0158808
   DOI: https://doi.org/10.8080/1020170158808?urlappend=en

Statement of interest

Network accessibility has become increasing important in today's fast paced world. In fact, it is difficult to imagine scenarios where our generation that cannot benefit from a wireless sensor network. Since the last eleven years I have been actively involved in academics, research projects and experiments. There are several reasons why I am applying for the research fellow position at Unibz.

During my PhD, I have been actively involved in research in multiple fields such as, vehicular communications, Future Internet architectures, Internet of things and underwater acoustic sensor networks. The focus of the research has been efficient and robust data communication in different environments.

During my previous work, one focus was on energy efficiency in wireless sensor and underwater sensor networks which is a key challenge for extending network lifetime. My work in the wireless sensor networks focused on energy efficient TDMA-based MAC protocols that improved the network lifetime and energy management. On the other hand, in the underwater sensor networks the focus was on duty cycle-based energy management that improved the network lifetime and reduces energy consumption of the battery powered sensors.

Connected vehicles have come a long way from the past decades and now we can image wireless communications among vehicles (V2V) and between vehicles and the equipment installed at the roadside (V2I). As vehicles move at the higher speed, therefore, network topology changes rapidly. Another effect of this mobility is the short link lifetime and variable network density. This makes it challenging to maintain vehicles' proximity information with minimum information exchange within the VANET. Therefore, various other wireless technologies have been tested in VANET such as 3G, LTE, WiMaX, and so on. I have been part of interesting research in this broad field so far.

Named Data Network (NDN) aka Content Centric Network (CCN) is a new and an extension of basic Information Centric Networking (ICN) architecture for future networks. Since NDN/CCN is at an early bud stage, therefore, many issues are still unidentified and open. These issues include vehicular NDN/CCN architecture, naming, routing or forwarding strategies, content storage, pending interest table management and policies, security and trust issues, etc. Our current research focus is to improve the reliability and robustness of the interest forwarding strategies, dynamics of a data request lifetime, restricting the flooding caused by packet propagation in vehicular-NDN.

In addition to research, I have been actively participating in writing research proposals, recently a joint project with researchers in Turkey was submitted which focused on providing emergency notifications to the on-road users with warnings based on the collected sensor data from vehicles and its surroundings. I have also been mentoring master's student during my PhD on various topics and have been actively

participating in review/chairing activities in various journals and conferences. In addition, I have also assisted my PhD advisor in teaching graduate level courses.

My interest in joining Unibz is based on my previous experiences. I believe that my skills and aspirations are in line with the requirements of the position. By being part of this project, I would be able to work on the potentials of applying NDN to the healthcare, transportation and tourism sectors. It would be a great opportunity to design communication models for different domains.

Language competence

Urdu: First Language
English: Proficient user
Punjabi: Proficient user
Italian: Basic user
Korean: Basic user

Date **24.01.2024**