

Arif Ullah (Khan)

Post Doctoral Researcher

Telecommunication and Networking Research Laboratory, Chosun University, South Korea

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Research Interest

- Wireless communications; 5G and beyond 5G networks; Stochastic geometry.
- Millimeter wave communications; UAV and RIS assisted communication; Massive MIMO
- Machine learning and AI enabled wireless communication.

Education

- sep 2017 — jul 2021** **Doctor of Philosophy (PhD)** • Electronic Engineering
GIK Institute of Engineering Sciences and Technology Topi, 23640, (Pakistan).
Study Emphasis: Wireless Communication and Networking
 Thesis: User-centric Small Cell Aided Future Cellular Networks: Sub-6GHz and Hybrid Millimeter Wave Communications.
 PhD Supervisor: Dr. Ziaul Haq Abbas
- mar 2014 — jul 2016** **Master of Science (MSc)** • Electrical Engineering
COMSATS University Tobe campus, Abbotabad, 22060, (Pakistan).
Study Emphasis: Wireless Communication and Signal Processing
 Thesis: Precise Estimation of Soft Output for Sphere decoding MIMO OFDM Receiver using Modified Likelihood Ascent Search Algorithm.
 MSc Supervisor: Prof. Dr. Shahid Khattak
- aug 2007 — dec 2011** **Bachelor of Science (BSc)** • Electronic Engineering
Balochistan University of Information Technology Engineering and Management Sciences (Pakistan).
Study Emphasis: Electronic and Communication Engineering
 Thesis: Real time Tracking, Monitoring and Controlling of Vehicles through GPS and GSM.

Professional Experience

- nov 2021 — apr 2022** **Postdoctoral Researcher** • Telecommunication and Networking Research Labortory, Department of Computer Engineering, College of IT Convergence
Chosun University (South Korea)
 Research task: My research at CU focuses on UAVs and Machine learning aided wire-less networks.
- sep 2017 — jun 2021** **Graduate Teaching/Research Assistant** • Faculty of Electrical Engineering
GIK Institute of Engineering Sciences and Technology Topi (Pakistan)
 My duty was to assist in lectures and to instruct in Labortory work at undergraduate and graduate level.
1. **Assisted as a teaching assistant** in the following undergraduate courses
 - Linear Circuit Analysis (EE-211) course (Fall 2017)
 - Digital Control System (EE-444) course (Spring 2021)
 2. **Assisted as an instructor** in the following undergraduate Labs
 - Electronics Devices and Circuit Lab (EE-231L) (Spring 2018-2019)
 - Signal and System Lab (EE-351L) (Fall 2018-2019)
 - Communication System Lab (EE-361L) (Spring 2020)

Jul 2016 — Jun 2017

Visiting Lecturer • Department of Electronics and Information Technology
COMWAVE Institute of Information Sciences and Technology, Abbotabad, (Pakistan)
Duty: Teaching and Departmental Responsibilities.

Sep 2012 — Aug 2013

Trainee Engineer • Operation and Maintenance
Egyptian Pakistani Telecommunication Company (Pakistan)
My duty was to coordinate with the senior engineers to deal with issues related to the operation and maintenance of mobile network

Publications

Peer-reviewed Publications

- J1. **Arif Ullah**, Ziaul Haq Abbas, Fazal Muhammad, Ghulam Abbas, Sunghwan Kim, "Uplink Performance Analysis of User-centric Small Cell Aided Dense HCNets with Uplink/Downlink Decoupling," *IEEE Access*, vol. 8, pp. 148460-148474, 2020.
DOI: [10.1109/ACCESS.2020.3015915](https://doi.org/10.1109/ACCESS.2020.3015915)
- J2. **Arif Ullah**, Ziaul Haq Abbas, Ghulam Abbas, Fazal Muhammad, Lei Jiao, "Performance Analysis of User-Centric SBS Deployment with Load Balancing in Heterogeneous Cellular Networks: A Thomas Cluster Process Approach," *Computer Networks*, vol. 170, pp. 107120, 2020. DOI: [10.1016/j.comnet.2020.107120](https://doi.org/10.1016/j.comnet.2020.107120)
- J3. Ziaul Haq Abbas, **Arif Ullah**, Ghulam Abbas, Fazal Muhammad, Frank Yong Li, "Outage Probability Analysis of User-Centric SBS based HCNets Under Hybrid Rician/Rayleigh Fading," " *In IEEE Communication Letters.*, pp. 1-1, Dec, 2019.
DOI: [10.1109/LCOMM.2019.2959578](https://doi.org/10.1109/LCOMM.2019.2959578)
- J4. **Arif Ullah**, Ziaul Haq Abbas, Ghulam Abbas, Fazal Muhammad, Lei Jiao, "Capacity Driven SBS Deployment in Heterogeneous Cellular Networks: Outage probability and Rate coverage Analysis," *In Transaction on Emerging Telecommunications Technologies*, 2019.
DOI: [10.1002/ett.3876](https://doi.org/10.1002/ett.3876)
- J5. Hammad Ahmad, Muhammad Mahmood Ali, **Arif Ullah**, Arbab Abdur Rahim, Husnul Maab, Mahmood Khan, "An Ultra-Thin Beam Splitter Design Using a-Si:H Based on Phase Gradient Metasurfaces," *Journal of Nano-electronics and Optoelectronics*, vol. 14, pp. 1339-1343(5), September 2019. DOI: [10.1166/jno.2019.2614](https://doi.org/10.1166/jno.2019.2614)
- J6. **Arif Ullah**, Ziaul Haq Abbas, Fazal Muhammad, Irfanullah, Alam Zeb, Shahid Khattak, "Likelihood ascent search augmented sphere decoding receiver for MIMO systems using MQAM constellations," *IET Communication*, vol. 14(22), pp. 4152-4158, December 2020.
DOI: [10.1049/iet-com.2019.1316](https://doi.org/10.1049/iet-com.2019.1316)
- J7. **Arif Ullah**, Ziaul Haq Abbas, Ghulam Abbas, Fazal Muhammad and Jae-Mo Kang, "Hybrid millimeter wave heterogeneous networks with spatially correlated user equipments," Accepted for publication in digital communication and networks. 2022.

Conference Contributions

- C8. **Arif Ullah**, Ziaul Haq Abbas, Ghulam Abbas, Fazal Muhammad, "Analysis of Outage Probability and Rate Coverage in Heterogeneous Cellular Networks with joint uniform and clustered users," *20nd IEEE International Multi topic Conference (INMIC)*, Islamabad, Pakistan, 29-30 Nov. 2019. DOI: [10.1109/INMIC48123.2019.9022767](https://doi.org/10.1109/INMIC48123.2019.9022767)

Manuscripts Submitted / in Preparation

- S9. **Arif Ullah**, and Wooyeol Choi, "Massive MIMO Assisted Aerial-Terrestrial Network: How Many UAVs Need to Be Deployed?", *Submitted to IEEE Transaction on Wireless Communication*, 2022. DOI: [10.36227/techrxiv.19397558.v1](https://doi.org/10.36227/techrxiv.19397558.v1)
- P10. **Arif Ullah**, Muhammad Ali Imran and Wooyeol Choi, "Modified Soft-output LAS Detection with Deep Learning Aided Channel Estimation for MIMO System", *Will be submitted to IEEE Wireless Communication Letters*, 2022.

Theses

- T1. **Arif Ullah**. (2021). User-centric Small Cell Aided Future Cellular Networks: Sub-6GHz and Hybrid Millimeter Wave Communications [Doctoral dissertation, GIK Institute of Engineering Sciences and Technology]. Institutional Repository at the University of ... <https://...>
- T2. **Arif Ullah** (2016). Precise Estimation of Soft Output for Sphere decoding MIMO OFDM Receiver using Modified Likelihood Ascent Search Algorithm [MSc. dissertation, COMSATS University]. Institutional Repository at the University of ... <https://...>

Notable Graduate Projects

2020–2021	Hybrid Millimeter Wave Heterogeneous cellular networks: This project investigate the performance of user-centric small cell aided HCNNet in hybrid millimeter wave setup.
2018–2019	User-centric small cells aided Heterogeneous cellular networks: This project focuses on the stochastic geometry modeling and performance evaluation of hotspot aided user-centric small cell deployment using in HCNNet.
Spring 2018	Beam splitter design using metasurfaces: This project focuses on design of ultra-thin beam splitter Using a-Si:H based on phase gradient metasurfaces in HFSS.
2015–2016	Precise estimation of soft output for sphere decoder: In this project we precisely estimated the soft output for sphere decoding (SD) receiver in multi antenna setup using low complexity modified likelihood ascent search algorithm (LAS) in MIMO OFDM system.
Fall 2014	Design of UHF-RFID Tags with Meander-Line Antennas: This project focuses on the design of different active and passive UHF-RFID tags and simulated small size meandered line antenna tag using HFSS for transportation application.

Courses Undertaken

Online Courses

2021	"Introduction to Machine Learning" offered by DUKE University online on Coursera
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Graduate Courses

2014	Stochastic Processes (EEE-611) • Optimization Techniques (EEE-712) • Microwave Passive Devices and Circuits (ETN-611) • Electromagnetic Field Theory (ETN-610) • Radio Engineering (ETN-616) • Data Networks and Communication (ETN-671)
2015	Linear System Theory (ECI-665) • Wireless Communication Techniques (ETN-644)
2017	Advance Algorithm and Computational Techniques (CS-506) • Organic Semiconductor and Devices (EE-633)
2018	Computational Methods for Engineers (ES-531) • Instrumentation and Control Systems (EN-541) • Cyber Security and IOT (CS-520) • Electromagnetic Meta materials (EE-613)

Skills

Programming	Python (basic) • Matlab • \LaTeX • C/C++ • Assembly language • Mathematica	
Software	Simulink • Advance Design System (ADS) • High Frequency Structured Simulation (HFSS) • CST Microwave Studio • Pspice • Electronic Workbench • Inkscape • Linux	
Languages	Native	Pashto
	Full professional proficiency	Uru
	Professional working proficiency	English

Membership & Awards

2017–2021	Postgraduate Fellowship • Graduate Assistantship (GA4), GIK Institute of Engineering Sciences and Technology (Paksitan) I obtained a graduate fellowship during my PhD studies.
2014 — 2016	Scholarship • Prime Minister Fee Reimbursement Scholarship by Higher Education Commission I obtained a full fee scholarship to cover the tuition fee expenses at the COMSATS University (Pakistan) during my master studies.
2019 — present	Member IEEE • Institute of Electrical and Electronics Engineers (IEEE) Membership #: 95038221.
2013 — present	Membership • Registered Engineer with Pakistan Engineering Council (PEC) Registration # ELECTRO/16479.

Organization and Community Services

Reviewing Activities

- o IEEE Wireless Communications Letter
- o RS Open Journal on Innovative Communication Technologies (RS-OJICT)

Presentation/Workshop/Seminars

- P1. **Paper Presentation:** 22nd IEEE International Multi Topic Conference held at National University of Computer and Emerging Sciences Islamabad Pakistan, 2019
- W1. **Attended:** First International Pak-Turk Workshop on Emerging Technologies in the Field of Sciences and Engineering held at GIK Institute Topi, Pakistan, 2018
- W2. **Attended:** Deep Intelligence, a Hands on Workshop organized by Aerial Robotic Lab GIK Institute Topi, Pakistan, 2021
- S1. **Attended:** Seminar on "Writing a Good Research Paper" held at GIK Institute Topi, Pakistan, 2019

References

- Dr. Ziaul Haq Abbas** **PhD Advisor** • Associate Professor, Faculty of Electrical Engineering, GIK Institute of Engineering Sciences and Technology Topi, 23640, Pakistan. Email: ziaul.habbas@giki.edu.pk, Phone: +92-312-5522633
- Dr. Ghulam Abbas** **PhD Co-advisor** • Associate Professor, Faculty of Computer Science and Engineering, GIK Institute of Engineering Sciences and Technology Topi, 23640, Pakistan. Email: abbasg@giki.edu.pk, Phone: +92-312-5432666
- Dr. Shahid Khattak** **MSc Advisor** • Professor, VC, University of Engineering and Technology Mardan, 23200, Pakistan. Email: skhattak710@gmail.com, Phone: +92-333-9400571