

# Arif Ullah Khan

## Graduate Research Assistant

Telecommunication and Networking (TeleCoN) Research Lab  
GIK Institute of Engineering Sciences and Technology Topi, 23640, Pakistan.

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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

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

## Professional Experience

<b>Jul 2010 – Sep 2010</b>	<b>Internship</b> • Pakistani Telecommunication Company Limited (Pakistan)
<b>Jun 2012 – Aug 2013</b>	<b>Trainee Engineer (Operation and Maintenance)</b> • Egyptian Pakistani Telecommunication Company (Pakistan) Deal with issues related to operation and maintenance of mobile network.
<b>Aug 2015 – Oct 2016</b>	<b>Visiting lecturer</b> • COMWAVE Institute of Information Sciences and Technology, Abbotabad, (Pakistan) Teaching and Departmental Responsibilities.

Sep 2017 – Jan 2021 **Graduate Teaching Assistant** • GLK Institute of Engineering Sciences and Technology (Pakistan)  
Assisting in lectures and laboratory activities for both undergraduate and graduate courses.

1. Assisted as teaching assistant in
  - Linear Circuit Analysis (EE-211) course (Fall 2017)
2. Assisted as lab instructor in
  - 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)

## Publications

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### 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
- 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
- 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
- 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
- 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 Nanoelectronics and Optoelectronics*, vol. 14, pp. 1339-1343(5), September 2019. DOI: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

### Manuscripts Submitted / in Preparation

- S1. **Arif Ullah**, Ziaul Haq Abbas, Ghulam Abbas, Fazal Muhammad and Jae-Mo Kang, "Hybrid millimeter wave heterogeneous networks with spatially correlated user equipments," Submitted to digital communication and networks. 2021.
- P1. Muhammad Tanveer, Abd Ullah Khan, **Arif Ullah** and Shehzad Ashraf Chaudhry, "An Efficient and Security Enhanced User Authentication Protocol for IoT-Based Intelligent Transportation System", *In Preparation*, 2021.

### Conference Contributions

- C1. **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

## 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

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<b>2019–2020</b>	Hybrid Millimeter Wave Heterogeneous cellular networks: This project investigate the performance of user-centric small cell aided HCNet in hybrid millimeter wave setup.
<b>2018–2019</b>	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 HCNet.
<b>Spring 2018</b>	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.
<b>2015–2016</b>	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.
<b>Fall 2015</b>	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

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### Online Courses

<b>2021</b>	<b>"Introduction to Machine Learning"</b> offered by DUKE University online on Coursera
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### Graduate Courses

<b>2014</b>	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)
<b>2015</b>	Linear System Theory (ECI-665) • Wireless Communication Techniques (ETN-644)
<b>2017</b>	Advance Algorithm and Computational Techniques (CS-506) • Organic Semiconductor and Devices (EE-633)
<b>2018</b>	Computational Methods for Engineers (ES-531) • Instrumentation and Control Systems (EN-541) • Cyber Security and IOT (CS-520) • Electromagnetic Meta materials (EE-613)

## Skills

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<b>Programming</b>	Python (basic) • Matlab • $\text{\LaTeX}$ • C/C++ • Assembly language • Mathematica
<b>Software</b>	Simulink • Advance Design System (ADS) • High Frequency Structured Simulation (HFSS) • CST Microwave Studio • Pspice • Electronic Workbench • Inkscape

Languages	Native	Pashto
	Full professional proficiency	Uru
	Professional working proficiency	English

## Membership & Awards

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<b>2017–2021</b>	<b>Postgraduate Fellowship</b> • Graduate Assistantship, GIK Institute of Engineering Sciences and Technology (Paksitan) I obtained a scholarship from the GIK Institute of Engineering Sciences and Technology (Paksitan) for the Promotion of Education and Studies to help cover the expenses as a PhD. student in GIK Institute of Engineering Sciences and Technology (Paksitan).
<b>2014 — 2016</b>	<b>Scholarship</b> • Prime Minister Fee Reimbursement Scholarship by Higher Education Commission I obtained a full fee scholarship to cover the tuition fee expenses at the COM-SATS University (Pakistan) during my master studies.
<b>2019 — Present</b>	<b>Membership</b> • Institute of Electrical and Electronics Engineers (IEEE) I am a graduate student member IEEE with membership #: 95038221.
<b>2013 — Present</b>	<b>Membership</b> • Pakistan Engineering Council I am a member of Pakistan Engineering council as registered engineer under Registration # ELECTRO/16479.

## Organization and Community Services

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### Reviewing Activities

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

## References

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<b>Dr. Ziaul Haq Abbas</b>	<b>PhD Advisor</b> • Associate Professor, Faculty of Electrical Engineering, GIK Institute of Engineering Sciences and Technology Topi, 23640, Pakistan. Email: <a href="mailto:ziaul.h.abbas@giki.edu.pk">ziaul.h.abbas@giki.edu.pk</a> , Phone: +92-312-5522633
<b>Dr. Ghulam Abbas</b>	<b>PhD Co-advisor</b> • Associate Professor, Faculty of Computer Science and Engineering, GIK Institute of Engineering Sciences and Technology Topi, 23640, Pakistan. Email: <a href="mailto:abbasg@giki.edu.pk">abbasg@giki.edu.pk</a> , Phone: +92-312-5432666
<b>Dr. Shahid Khattak</b>	<b>MSc Advisor</b> • Professor, VC, University of Engineering and Technology Mar-dan, 23200, Pakistan. Email: <a href="mailto:skhattak710@gmail.com">skhattak710@gmail.com</a> , Phone: +92-333-9400571