# Umair Ahmad Mughal

Ph.D. Candidate
Department of Computer Science
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## Educational Background

**Ph.D. in Computer Science and Engineering** 2021-to date
Tennessee Tech University TN, USA
CGPA: 3.5/4.0

**Master of Science in Electrical and Computer Engineering** 2020
INHA University Incheon, South Korea
CGPA: 4.4/4.5

**Bachelor of Science in Electrical Engineering** 2015
University of Engineering and Technology Peshawar, Pakistan
CGPA: 3.08/4.0

## Research Interests

- Cybersecurity of autonomous vehicles (UAVs)
- Machine learning for security enhancement
- Cellular Vehicle-to-Everything (C-V2X) Technology
- Interference Management in 3GPP LTE-A & 5G Systems

## Professional Experience

**Graduate Research Assistant** 2021-to date
*Cybersecurity Education, Research and Outreach Centre (CEROC)* Tennessee, USA
- The experimental research of cybersecurity on autonomous vehicles especially drones.
- Executed attacks such as DoS, Replay, Evil Twin, and False data injection attacks on real world drone Swarm.
- Developed machine learning based intrusion detection system to tackle cyber-attacks.

**Research Engineer** 2020-2021
*Oceanic IT Convergence Research Centre* Asan, South Korea
- Data analysis of underwater acoustic communication using machine learning for link adaptation and throughput.
- Collected underwater acoustic data in the Incheon Sea over 1km and 3km distances between Tx and Rx.
- Designed algorithms for autonomous underwater vehicle's (AUV) and embedded them to the AUV.

**Graduate Research Assistant** 2018-2020
*Mobile Telecommunication Research Laboratory (MTRL), Inha University* Incheon, South Korea
- Developed cellular vehicle-to-everything (C-V2X) simulator according to 3GPP Rel. 14 & 15.
- V2X Side-link & PC5 Interface (V2V, V2I), 5G-NR, and DSRC communication in vehicular environments
- Simultaneous Localization and Mapping (SLAM) technology for UAVs

**Lab Engineer** 2016-2018
*Qurtuba University of Sciences and Technology* Pakistan
- Wireless communication
- Digital signal processing

**PLC & SCADA Intern Engineer** 2015-2016
*Master Tiles & Ceramic Industries Limited* Pakistan
- Ladder Logic programming for PLC designing for Ceramic Plant operation.
- Worked closely in operation for overall control system.

**BSS Intern Engineer** June 2014 - September 2014
Alcatel-Lucent ltd. Pakistan
- Worked at BSS-CMPak project in Operation and Maintenance department.
- Implements modifications for the BTS sites.

## Skills

- Tools/software: MATLAB, Keras, Scikit-learn, Pandas, Scapy, Docker, Git, Aircrack-ng, Nmap, Wireshark, Ardupilot, Arduino, and Q-Groundcontrol.
- Programming Languages: Proficient in Python, Assembly, Shell Scripting, Java, and C/C++.

## Certifications

- Penetration Testing, Incident Response and Forensics, IBM Cybersecurity Analyst Professional Certificate (Coursera)
- Robotics: Aerial Robotics, University of Pennsylvania (Coursera)
- State Estimation and Localization for Self-Driving Car, University of Toronto (Coursera)
- Drone Programming, Software Development for Unmanned System (Udemy)

## Honors and Awards

- Recipient of the Jungseok International Scholarship to pursue M.S. Studies at Inha University, Korea.
- Awarded with Full funded Scholarship from Provincial Govt. for Undergraduate studies, under the KPK Govt. Talent Hunt Programs.
- Awarded with Laptop for best performance from the Provincial Chief Minister KPK, Ameer Haider Khan Hoti.
- Member Pakistan Engineering Council, Accreditation No. ELECT/52138.
- Reviewer at Vehicular Communication, Elsevier Journal
- Reviewer at IEEE Networking Letters
- Reviewer at IEEE Internet of Things (IoT) Journal
- Reviewer at IEEE Internet of Things Magazine (IoTM)

## Publications

### International Journal

- **U. A. Mughal**, J. Xiao, I. Ahmad, and K. H. Chang, "Cooperative Resource Management for Cellular V2I Communications in a Dense Urban Environment", Vehicular Communications, Elsevier, Aug. 2020.Link (IF=8.373)
- N. Ramsha, I. Ahmad, **U. A. Mughal**, and Z. Kaleem, "Shortest Propagation Delay-based Relay Selection for Underwater Acoustic Sensor Networks," *IEEE Access,* Feb. 2021.Link (IF= 3.476)
- **U. A. Mughal** and K. H. Chang, "UAVs Path Planning using Reinforced Swarm Optimization based on a Visual-SLAM Algorithm," *IEEE Transactions on Mobile Computing,* 2021. (1st Review completed) (IF= 6.075)

### Conference

- **U. A. Mughal**, I. Ahmad, and K.H. Chang, "Virtual cells operation for 5G V2X communications", *in Proc. KICS*, Feb. 2019.Link
- **U. A. Mughal**, I. Ahmad, and K. H. Chang, "Cellular V2X communications in unlicensed spectrum: Compatible coexistence with VANET in 5G systems", *in Proc. IEEE JCCI*, May 2019.Link
- Nafis Ahmad, **U. A. Mughal**, and KyungHi Chang, "3D Path Planning of Unmanned Aerial Vehicles", *in Proc. KICS*, Feb. 2020.Link

### Patent

- System and Method for Co-channel Interference Management using Dynamic ICIC with Coordinated Scheduling for Cellular V2I Communications in Dense Urban Environment, *INHA University Industry-Academia Cooperation Foundation*, Program No. C-2019-024785, 2019-09-05. (Filed, August 2020)

  Korean Name:
  KyungHi Chang, **Umair Ahmad Mughal,** J. Xiao, and I. Ahmad, 밀집도심의 셀룰러 V2I 환경에서 협력 스케줄링과 동적 셀 간 간섭 제거 기법을 활용한 동일 채널 간섭 관리를 위한 시스템 및 방법

### Simulator

- **Developed V2X-Simulator and delivers to Korea's MSIT (Ministry of Science, Information, and Technology)**
  Performance Analysis System Level Simulator in LTE-V2X Network Environment", *INHA University Industry-Academia Cooperation Foundation.*

- **Developed Link Adaptation Simulator and handed over to the Oceanic IT Convergence Research Centre, Hoseo University**
  Link Adaptation for Next-Generation Underwater Acoustic Communications Networks, *Oceanic IT Convergence Research Centre, Hoseo University.*