Muhammad Salman, Ph.D.
Zoom: http://tiny.cc/salmankhan
Skype: engr.salman_khan

Email : salman@kentech.ac.kr
Mobile : +82-10-2134-4007

Education

Inha University — **Mar. 2020 – Feb. 2023**
Ph.D. in Electical anc Computer Engineering — Incheon, South Korea
Major: Computer Science and Engineering

Politecnico di Torino — **Oct. 2011 – Mar. 2014**
MS. in Electronics Engineering — Turin, Italy
Major: Wireless Systems Design

BUITEMS — **Aug. 2006 – Sep. 2010**
BSc. in Electronics Engineering — Quetta, Pakistan

Research Thesis

Ph.D Thesis: Unobtrusive Spy Camera Detection in Diverse Indoor Environments
Masters Thesis: Resource allocation and Power control of Device-to-Device Communication

Research Interests

mmWave Radar, Wireless Networks, Software Defined Networks, Spy Camera Detection, vital signals detection using RF, Bufferbloat and Active Queue Management schemes.

Recent Publications (Last 3 Years)

Journal Publications (First Author: 4, *Corresponding Author: 1, Co-author: 2)

J7. **M. Salman**, N. Dao, U. Lee, and Y. Noh. CSI:DeSpy: Enabling Effortless Spy Camera Detection via Passive Sensing of User Activities and Bitrate Variations. Published in proceedings of the *ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* (2022).

J6. **M. Salman**, J. Son, D. Choi, U. Lee and Y. Noh. DARCAS: Dynamic Association Regulator Considering Airtime over SDN-enabled Framework. Published in *IEEE Internet of Things Journal* (2022).

J5. **M. Salman**, T. J. Chaudhery, and Y. Noh. Study on performance of AQM schemes over TCP variants in different network environments. Published in IET Communications (2021).

J4. D. Dao, **M. Salman**, and Y. Noh. DeepDeSpy: A Deep Learning-Based Wireless Spy Camera Detection System. Published in IEEE Access (2021).

J3. L. A. Caceres-Najarro, I. Song, S. Tomic, **M. Salman**, Y. Noh and K. Kim. Evolutionary Tracking Algorithm based on Combined Received Signal Strength and Angle of Arrival Measurements in Wireless Sensor Networks. Published in *IEEE Sensors* (2023).

J2. **M. Salman**, Y.-D. Seo, Y. Noh. WiSOM: WiFi-Enabled Self-Adaptive System for Monitoring the Occupancy in Smart Buildings. Under Review in *Elsevier Energy* (2023).

J1. Kobiljon Toshnazarov, **M. Salman***, U. Lee, Y. Noh. EasyTrack: A Scalable and General Purpose Platform for Reliable Data Collection in mHealth Research. Under Review in *IEEE Internet of Things* (2023).

Conference Publications (First Author: 4 (two top-tiers), Corresponding Author: 1, Co-author: 0)

C4. **M. Salman**, N. Dao, U. Lee, and Y. Noh. CSI:DeSpy- Enabling Effortless Spy Camera Detection via Passive Sensing of User Activities and Bitrate Variations. Presented in UbiComp 2022 (top-tier, 20% acceptance rate).

C3. **M. Salman***, H. Jang, Y. Noh, S. Jin, D. Jeong, H. Choi, K. Han, H. Kim. A Contactless and Non-Intrusive System for Driver's Stress Detection. Presented in UbiComp 2023 (top-tier, 20% acceptance rate).

C2. **M. Salman**, Y.-D. Seo, and Y. Noh. WiFi-enabled Occupancy Monitoring in Smart Buildings with a Self-Adaptive Mechanism. Presented in ACM SAC 2023 (35.4% acceptance rate).

C1. **M. Salman**, and Y. Noh. Contactless Vital Signs Tracking with mmWave RADAR in Realtime. Presented in IEEE BigComp 2023.

Research and Academic Experience

Research Experience

Postdoctoral Researcher at Korea Institute of Energy Technology (KENTECH) Feb. 2023 – Present
Intelligent Mobile Computing Lab (*Naju-si, South Korea*)

- Working on developing a non-intrusive and contactless stress detection system for a driver. This work involves creating a real-life testbed for multimodal data collection from diverse sensors including mmWave Radar, camera, and chest strap sensor, etc.
- Occupancy monitoring of occupant(s) in the target space (e.g., smart buildings) using commodity WiFi signals.
- Partially working on the cybersecurity aspect of a military microgrid.

Academic Experience

Lecturer at EFFAT University Jul. 2017 – Jun. 2019
Department of ECE (*Jeddah, Saudi Arabia*)

- Taught various courses related to the Electrical and Computer Engineering syllabus, including, (1) Data Science using Python; (2) Radar Signal Processing (With Python and MATLAB); (3) Communication Systems (with MATLAB); (4) Digital Communication (with labs in MATLAB); (5) Digital Logic Design (6) and Computer Networks (wired and wireless) with Network Simulation (ns-2).

Lab Engineer at EFFAT University Aug. 2014 – Jul. 2017
Department of ECE (*Jeddah, Saudi Arabia*)

- Conducted various labs for the following courses: (1) Digital and Wireless Communication (used LD Modulation KITs and MATLAB/Simulink); (2) Digital Signal Processing (on MATLAB); (3) Computer Networks (used packet tracer, and various tools for ethernet cable making and testing such as Cramper, Cutter, Cable Tester, Router, Networking Switch, RJ 45 Male/Female Connectors, and CAT 6 Cable); (4) Computational Methods (MATLAB); (5) Microwave Electronics Circuits (used MATLAB and lab kits from Lucus Nulle – Germany); (6) Embedded Systems (used TI MSP-EXP430G2 LaunchPad, and code composer studio software) and (7) Introduction to Computational Methods (MATLAB from Basics to advanced).

Lecturer Assistant at Inha University Sep. 2019 – Feb. 2023
Department of ECE (*Incheon, South Korea*)

- During my Ph.D., I taught the following courses as a lecture assistant. They are available online on YouTube. (1) Socket Programming in C (Playlist of 12 lectures); (2) Wireless Digital Communication with MATLAB (Playlist of 13 lectures); and (3) 5G MIMO Technology and Power Control (Playlist of 2 seminar videos).

Teaching Assistant at Politecnico di Torino Mar. 2012 – Sep. 2012
Department of Electronics and Telecommunications (*Torino, Italy*)

- Served as a teaching assistant for a course named Computer-Aided Design for Communication Systems for one semester.

Ongoing and Completed Projects

Ongoing Projects

- **Contactless Stress Monitoring of a Driver (Hyundai Motors Project):** Utilizing a contactless approach, we gather multimodal data from the driver. This includes physiological metrics like heart rate variability and breathing via mmWave radar, facial emotions from video, and ground truth data from devices like Polar H10 and E4. The collected data undergoes fusion for unification, followed by the deep learning model for classifying the driver's stress state (Positioning paper published in UbiComp 2023).
- **Military Microgrid (Korea Institute of Energy Technology Evaluation and Planning – KETEP Project):** As part of a major collaborative project with fellow researchers at KENTECH, our objective is to construct a military microgrid from the ground up. My specific contribution to this project involves exploring strategies to ensure seamless network resilience in the event of damage or compromise due to either physical or cyber-attacks.

Completed Projects

- **Spy Camera Detector (National Research Foundation of Korea – NRF Project):** We introduced an innovative approach for spy camera detection through traffic analysis. This method demonstrated high reliability across various indoor environments and for activities of varying intensities. Importantly, it operated unobtrusively, eliminating the need to physically carry or hold the system for camera detection. Instead, it could be discreetly placed anywhere within the target space while still effectively detecting the camera (Published in ACM IMWUT).
- **mHealth data collection platform (National Research Foundation of Korea – NRF Project):** We introduced EasyTrack, a solution that was scalable, accommodating a diverse range of participants and their associated sensors. It offered general-purpose functionality, making it flexible for diverse mHealth applications. It incorporated a Data Quality monitoring mechanism with a user-friendly dashboard and automatic problem-detecting routine that warned the researcher of potential discrepancies in collected data. It provided interoperability with the existing data collection platforms (Under review in IEEE internet of things).
- **Occupancy monitoring system (Korea Institute of Energy Technology Evaluation and Planning – KETEP Project):** We developed an adaptive occupancy detection system using WiFi's channel state information (CSI). It's robust in diverse indoor environments. We rigorously tested WiSOM under various conditions, including multipath effects, different activity intensities, and real-home scenarios with wall absorption (Version 1 Published in ACM SAC, and Version 2 Under review in Elsevier Energy).
- **Improving UX in SDN enabled framework:** We developed an SDN-enabled WiFi framework for efficiently regulating the user's association. DARCAS prioritizes user experience through Bandwidth Satisfaction Ratio (BSR) to optimize network throughput while ensuring each user receives ample airtime. Real-life experiments and extensive simulations demonstrate its scalability and effectiveness. (Published in IEEE Internet of Things).

Programming and Technical Skills

Languages: Python, C/C++, oTCL programming language for NS-2, MATLAB, and VHDL.
Developer Tools: Auto CAD, Jupyter Notebook, Model SIM, QUARTUS 2, CAE tool AWR Microwave Office (MWO), ADF(EMS) Software for advance antenna design, Code Composer Studio, Mathematica, Packet Tracer, and PyCharm.
Technologies/Frameworks: MS Office, Linux, Jenkins, GitHub, ZOOM, and Latex

Distinction Awards

- **Global vision Scholarship** for PhD awarded by Inha University for the entire PhD Course.
- **EDISU merit Scholarship** awarded for entire MS study in Italy.
- **Erasmus/LLP Scholarship** awarded for research thesis in Chalmers University of Technology, Sweden.
- **Teacher Assistant** for CAD of communication system LAB for the whole semester. (This award is granted to talented students at Politecnico di Torino, Italy).
- **Gold Medal** awarded on clenching 1^{st} Position in Bachelor of Science in Electronic Engineering, securing 3.92/4.00 CGPA at Balochistan University of Information Technology, Engineering and Management Sciences (BUITEMS) Pakistan.
- **Merit scholarship** for undergrad studies on securing consistent top position in each semester.
- Clenched **first position** in Quiz competition during undergraduate study in an inter-province contest in BUITEMS Quetta.

Professional Registration

- Member Pakistan Engineering Council, Accreditation number ELECTRO/13497.
- Member of the Association for Computing Machinery (ACM).

Language Proficiency

- **English** (Fluent in writing, reading, listening and speaking).
- **Urdu** (National language, fluent in writing, reading, listening, and speaking).
- **Pushto** (Mother tongue, fluent in speaking and listening, intermediate reading and writing).

References

- **Professor Youngtae Noh** (Ph.D. Advisor). Associate professor and director of the Intelligent Mobile Computing Lab, KENTECH, South Korea.
  +82 (0) 61-320-9248
  ytnoh@kentech.ac.kr
- **Professor Young-Duk Seo** (Co-Ph.D. Advisor). Assiatant professor and director of the Knowledge-based Data Discovery Lab, Inha University, South Korea.
  +82 (0) 32-860-8425
  mysid88@inha.ac.kr
- **Professor Uichin Lee** (Co-Ph.D. Advisor). Associate Professor School of Computing and director of Interactive Computing Lab, KAIST, South Korea.
  uclee@kaist.ac.kr
- **Professor Eric Strom** (MS. Thesis Advisor). Professor, Head of Division, Communication and Antenna systems, Electrical engineering, Chalmers university of Technology, Sweden.
  erik.strom@chalmers.se