

Dr. Muhammad Bilal Khan



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Research Interests

Software-Defined Radios, Radio Frequency Sensing, Digital Healthcare, Artificial Intelligence, Machine learning, Deep Learning, Signal Processing, Digital Signal Processing, Wireless Communication, Digital Communication, Radar Systems, Massive MIMO Systems, OFDM Systems, Cooperative Networks, Digital Logic Design and Electric Circuit Analysis

Education

Sept 2018 – June, 2021 **Doctor of Philosophy in Information and Communications Engineering**
Thesis Title: *Non-Contact Smart Health Sensing by Exploiting Software Defined Radios Technology*
School of Electronic Engineering, Xidian University, China
Awards: Outstanding International Student in China (2020)
Academic Excellence (2020-2021)
Academic Innovation (2020-2021)
Scholarship: Chinese Government Scholarship

Sept, 2010 – Jan, 2013 **Master of Science in Electrical Engineering**
Thesis Title: *Performance Analysis of OFDMA-based Cooperative Network Over Different Fading Environments.*
COMSATS Institute of Information Technology Attock, Pakistan

Sept, 2005 – July, 2009 **Bachelor of Science in Electronics Engineering**
Thesis Title: *Software-Defined Radio using DSP*
COMSATS Institute of Information Technology Abbottabad, Pakistan

Journal Publications

- 2023**
1. AbuAli, Najah, **Mohammad Bilal Khan**, Farman Ullah, Mohammad Hayajneh, Hikmat Ullah, and Shahid Mumtaz. "Software defined radio frequency sensing framework for Internet of Medical Things." *Information Fusion* (2023): 102106. **Impact Factor** (18.6)
 2. **Khan, Muhammad Bilal**, Najah AbuAli, Mohammad Hayajneh, Farman Ullah, Mobeen Ur Rehman, and Kil To Chong. "Software defined radio frequency sensing framework for intelligent monitoring of sleep apnea syndrome." *Methods* (2023). **Impact Factor** (4. 647)
 3. AbuAli, Najah, **Muhammad Bilal Khan**, and Zulqurnain Sabir. "A computational stochastic procedure for solving the epidemic breathing transmission system." *Scientific Reports* 13, no. 1

(2023): 16220. **Impact Factor** (4.997)

4. Mustafa, Ali, Farman Ullah, Mobeen Ur Rehman, **Muhammad Bilal Khan**, Shujaat Ali Khan Tanoli, Muhammad Kaleem Ullah, Hamza Umar, and Kil To Chong. "Non-Intrusive RF sensing for early diagnosis of spinal curvature syndrome disorders." *Computers in Biology and Medicine* (2023): 106614. **Impact Factor** (6.698)
5. Rehman, Mubashir, Raza Ali Shah, Najah Abed Abu Ali, **Muhammad Bilal Khan**, Syed Aziz Shah, Akram Alomainy, Mohammad Hayajneh, Xiaodong Yang, Muhammad Ali Imran, and Qammer H. Abbasi. "Enhancing System Performance through Objective Feature Scoring of Multiple Persons' Breathing Using Non-Contact RF Approach." *Sensors* 23, no. 3 (2023) **Impact Factor** (3. 275)
- 2022
6. Rehman, Mubashir, Najah Abed Abu Ali, Raza Ali Shah, **Muhammad Bilal Khan**, Syed Aziz Shah, Akram Alomainy, Xiaodong Yang, Muhammad Ali Imran, and Qammer H. Abbasi. "Development of an Intelligent Real-time Multi-Person Respiratory Illnesses Sensing System using SDR Technology." *IEEE Sensors Journal* (2022). **Impact Factor** (3. 275)
7. Zhang, Xiangyang, Xiaodong Yang, Nan Zhao, and **Muhammad Bilal Khan**, "Analysis of the Applicable Range of the Standard Lambertian Model to Describe the Reflection in Visible Light Communication," *Electronics* 11, no. 9 (2022): 1514. **Impact Factor** (2.110)
8. Yuan, Chang, **Muhammad Bilal Khan**, Xiaodong Yang, Fiaz Hussain Shah, and Qammer Hussain Abbasi. "Cheyne-Stokes Respiration Perception via Machine Learning Algorithms." *Electronics* 11, no. 6 (2022): 958. **Impact Factor** (2.110)
9. **Khan, Muhammad Bilal**, Ali Mustafa, Mubashir Rehman, Najah Abed AbuAli, Chang Yuan, Xiaodong Yang, Fiaz Hussain Shah, and Qammer H. Abbasi. "Non-Contact Smart Sensing of Physical Activities during Quarantine Period Using SDR Technology." *Sensors* 22, no. 4 (2022): 1348. **Impact Factor** (3.576)
- 2021
10. Rehman, Mubashir, Raza Ali Shah, **Muhammad Bilal Khan**, Syed Aziz Shah, Najah Abed AbuAli, Xiaodong Yang, Akram Alomainy, Muhammad Ali Imran, and Qammer H. Abbasi, "Improving machine learning classification accuracy for breathing abnormalities by enhancing dataset," *Sensors* 21, no. 20 (2021): 6750. **Impact Factor** (3. 275)
11. **Khan, Muhammad Bilal**, Mubashir Rehman, Ali Mustafa, Raza Ali Shah, and Xiaodong Yang. "Intelligent Non-Contact Sensing for Connected Health Using Software Defined Radio Technology." *Electronics* 10, no. 13 (2021): 1558. **Impact Factor** (2.110)
12. Rehman, Mubashir, Raza Ali Shah, **Muhammad Bilal Khan**, Najah Abed AbuAli, Syed Aziz Shah, Xiaodong Yang, Akram Alomainy, Muhmmad Ali Imran, and Qammer H. Abbasi. "RF sensing based breathing patterns detection leveraging USRP devices." *Sensors* 21, no. 11 (2021): 3855. **Impact Factor** (3. 275)
13. Rehman, Mubashir, Raza Ali Shah, **Muhammad Bilal Khan**, Najah Abed Abu Ali, Abdullah Alhumaidi Alotaibi, Turke Althobaiti, Naeem Ramzan et al. "Contactless Small-Scale Movement Monitoring System Using Software Defined Radio for Early Diagnosis of COVID-19." *IEEE Sensors Journal* (2021). **Impact Factor** (3.073)
- 2020
14. Zhao, Nan, Xiaodong Yang, Zhiya Zhang, and **Muhammad Bilal Khan**. "Circulating Nurse Assistant: Non-contact Body Centric Gesture Recognition towards Reducing Iatrogenic Contamination." *IEEE Journal of Biomedical and Health Informatics* (2020). **Impact Factor** (5.223)
15. **Khan, Muhammad Bilal**, Ahmed Hussain, Umar Anjum, Channa Babar Ali, and Xiaodong Yang. "Adaptive Doppler Compensation for Mitigating Range Dependence in Forward-

Looking Airborne Radar." *Electronics* 9, no. 11 (2020): 1896. **Impact Factor** (2.110)

16. **Khan, Muhammad Bilal**, Zhiya Zhang, Lin Li, Wei Zhao, Mohammed Ali Mohammed Al Hababi, Xiaodong Yang, and Qammer H. Abbasi. "A Systematic Review of Non-Contact Sensing for Developing a Platform to Contain COVID-19." *Micromachines* 11, no. 10 (2020): 912. **Impact Factor** (2.523)
17. Zhang, Xiangyang, Nan Zhao, Fadi Al-Turjman, **Muhammad Bilal Khan**, and Xiaodong Yang. "An Optimization of the Signal-to-Noise Ratio Distribution of an Indoor Visible Light Communication System Based on the Conventional Layout Model." *Sustainability* 12, no. 21 (2020): 9006. **Impact Factor** (2.576)
18. **Khan, Muhammad Bilal**, Chunxi Dong, Mohammed Ali Mohammed Al-Hababi, and Xiaodong Yang. "Design of a portable and multifunctional dependable wireless communication platform for smart health care." *Annals of Telecommunications* (2020): 1-10. **Impact Factor** (1.142)
19. Al-hababi, Mohammed Ali Mohammed, **Muhammad Bilal Khan**, Fadi Al-Turjman, Nan Zhao, and Xiaodong Yang. "Non-Contact Sensing Testbed for Post-Surgery Monitoring by Exploiting Artificial-Intelligence." *Applied Sciences* 10, no. 14 (2020): 4886. **Impact Factor** (2.523)
20. Jin, Jiabin, Wanrong Sun, Fadi Al-Turjman, **Muhammad Bilal Khan**, and Xiaodong Yang. "Activity pattern mining for healthcare." *IEEE Access* 8 (2020): 56730-56738. **Impact Factor** (3.725)
21. Tanoli, Shujaat Ali Khan, Syed Aziz Shah, **Muhammad Bilal Khan**, Faiza Nawaz, Amir Hussain, Ahmed Y. Al-Dubai, Imran Khan, Syed Yaseen Shah, and Ayoub Alsarhan. "Impact of Relay Location of STANC Bi-Directional Transmission for Future Autonomous Internet of Things Applications." *IEEE Access* 8 (2020): 29395-29406. **Impact Factor** (3.725)
22. Zilani, Tanjila Akter, Fadi Al-Turjman, **Muhammad Bilal Khan**, Nan Zhao, and Xiaodong Yang. "Monitoring Movements of Ataxia Patient by Using UWB Technology." *Sensors* 20, no. 3 (2020): 931. **Impact Factor** (3.275)
23. Zhu, Qiyu, Lei Guan, **Muhammad Bilal Khan**, and Xiaodong Yang. "Monitoring of Huntington's Disease Based on Wireless Sensing Technology." *Applied Sciences* 10, no. (2020): 870. **Impact Factor** (3.275)
- 2019
24. Guan, Lei, Fangming Hu, Fadi Al-Turjman, **Muhammad Bilal Khan**, and Xiaodong Yang. "A non-contact paraparesis detection technique based on 1D-CNN." *IEEE Access* 7 (2019): 182280-182288. **Impact Factor** (3.745)
25. Yang, Xiaodong, Dou Fan, Aifeng Ren, Nan Zhao, Zhiya Zhang, Daniyal Haider, **Muhammad Bilal Khan**, and Jie Tian. "Non-Contact Early Warning of Shaking Palsy." *IEEE Journal of Translational Engineering in Health and Medicine* 7 (2019): 1-8. **Impact Factor** (2.530)
26. Deng, Jiewen, Wanrong Sun, Lei Guan, Nan Zhao, **Muhammad Bilal Khan**, Aifeng Ren, Jianxun Zhao, Xiaodong Yang, and Qammer H. Abbasi. "Non-invasive Suspicious Liquid Detection Using Wireless Signals." *Sensors* 19, no. 19 (2019): 4086. **Impact Factor** (3.275)
27. **Khan, Muhammad Bilal**, Xiaodong Yang, Aifeng Ren, Mohammed Ali Mohammed Al-Hababi, Nan Zhao, Lei Guan, Dou Fan, and Syed Aziz Shah. "Design of software-defined radios based platform for activity recognition." *IEEE Access* 7 (2019): 31083-31088. **Impact Factor** (3.745)
- 2018
28. Tanoli, Shujaat Ali Khan, Mubashir Rehman, **Muhammad Bilal Khan**, Ihtesham Jadoon, Farman Ali Khan, Faiza Nawaz, Syed Aziz Shah, Xiaodong Yang, and Ali Arshad Nasir. "An

experimental channel capacity analysis of cooperative networks using Universal Software Radio Peripheral (USRP)." *Sustainability* 10, no. 6 (2018): 1983. **Impact Factor** (2.576)

- 2017 29. Arshad, Hasnain, Aamir Habib, Ali Mustafa, **Muhammad Bilal Khan**, and Saad Zahid. "Pairing and Scheduling for Large Array MIMO Using Regularized Channel Inversion Receivers Over Nakagami-m Fading." *Wireless Personal Communications* 96, no. 4 (2017): 6397-6424. **Impact Factor** (1.20)
- 2014 30. **Muhammad Bilal Khan**, I. Jadoon, Junaid Ali Khan, and S. A. K. Tanoli. "Analysis of Cooperative Networks Based on WiMAX LDPC Code." *Research Journal of Applied Sciences, Engineering and Technology* 8, no. 19 (2014): 2026-2031.

Conference Papers

- 2023 1. Ali, Najah Abed Abu, Mubashir Rehman, **Muhammad Bilal Khan**, Mohammad Hayajneh, and Shayma Al Kobaisi. "Acute Inhalation Injury Signatures in Breathing Rate Abnormalities in Domestic Environment using RF Sensing." In *2023 International Wireless Communications and Mobile Computing (IWCMC)*, pp. 842-847. IEEE, 2023. (Presenter)
- 2021 2. Babar Ali Channa, Syed Yaseen Shah, **Muhammad Bilal Khan**, Abdul Haseeb Khan, Kawish Parvaiz, Syed Aziz Shah " High Efficiency High Gain DC-DC Boost Converter Using PID Controller for Photovoltaic Applications," *International Congress of Advanced Technology and Engineering (ICOTEN)*, 2021.
- 2020 3. Babar Ali Channa, Umar Anjum, Muhammad Hashsham Chishti, Umer Afzal, **Muhammad Bilal Khan**, Ahmed Hussain, Shahzad Arshad, "Miniaturized Grounded Co-planar Waveguide Based X-Band Equal Split Wilkinson Power Divider for AESA Application," *IEEE 23rd International Multitopic Conference (INMIC)*, 2020.
- 2018 4. Ali, Channa Babar, **M. Bilal Khan**, Mubashir Rehman, and Shujaat Ali Khan Tanoli. "NI-USRP based experimental evaluation of cooperative communication over direct communication in lab environment." In *2018 International Conference on Electronics, Information, and Communication (ICEIC)*, pp. 1-5. IEEE, 2018. (Presenter)

Submitted Journal Papers

- 2023 1. Exploiting Wireless Communication Using Software-Defined Radio Frequency Sensing for E-Health Applications. **Journal:** IEEE Communications Standards Magazine **Impact Factor:** 4.99 **Status:** Accepted
2. Contactless Diseases Diagnoses using Wireless Communication Sensing: Methods and Challenges Survey. **Journal:** Computing Surveys **Impact Factor:** 14.324 **Status:** Underreview
3. Framework for Emotional Intelligence Based on Non-Contact Sensing Leveraging Tactile Internet. **Journal:** IEEE Network Magazine **Impact Factor:** 10.294 **Status:** Underreview
4. Software Defined Radio Based Sensing for Breathing Monitoring: Design, Challenges, and Performance Evaluation. **Journal:** Computers in Biology and Medicine **Impact Factor:** 6.698 **Status:** Submitted
5. Computational Intelligent Framework for Human Emotion Recognition Leveraging Non-Contact Software-Defined RF Sensing and Sequential Deep Learning. **Journal:** Computers in Human Behavior **Impact Factor:** 8.957 **Status:** Submitted
6. A Non-Invasive Smart Sensing of Text Neck Syndrome using SDR Technology. **Journal:** Expert Systems with Applications **Impact Factor:** 8.665 **Status:** Submitted
7. Next-Generation Security: Detecting Suspicious Liquids through Radio Frequency Sensing and Machine Learning. **Journal:** IEEE sensors **Impact Factor:** 4.3 **Status:** under review

Research Collaborations

- University of Glasgow, Scotland, UK
- Ulster University, Northern Ireland, UK
- COMSATS University Islamabad, Pakistan
- United Arab Emirates University, Al Ain, UAE
- Jeonbuk National University, Jeonju, South Korea
- Xidian University, Xi'an, China

Project Funding and Grants

- U.S. Department of Commerce under Grant BS123456
- National Natural Science Foundation of China 61301175
- Fundamental Research Funds for the Central Universities, grant number JB180205
- Higher Education Commission Travel Grant USA
- Research grant UAEU-AUA Joint-Research

Services

- 2018** **Session Chair**
International Conference on Electronics, Information, and Communication, 2018, Hawaii USA.
- 2014** **Trainer**
Universal software defined radio peripheral (USRP) Hands-on training, Islamabad, Pakistan.
- 2010** **Consultant**
Rural Support Program Networks, Islamabad, Pakistan.

Teaching and Research Experience

- Jan 25, 2023** **Assistant Professor**
Till date Department of Electrical and Computer Engineering, COMSATS University Islamabad, Pakistan
- June 2022-** **Post-Doctorate Research Fellow(Ex-Pakistan Leave)**
Sept, 2023 College of Information Technology, United Arab Emirates University, Al Ain UAE.
- June 2013-** **Lecturer**
May 2022 Department of Electrical and Computer Engineering, COMSATS University Islamabad, Pakistan
- Courses Taught**
- Signals and Systems
 - Principles of Communication
 - Electric Circuits Analysis
 - Data Communication and Computer Networking
 - Digital Signal Processing
- Dec 2012 –** **Lab Engineer**
June 2013 Department of Electrical and Computer Engineering, COMSATS University Islamabad, Pakistan
- Lab's demonstrations**
- Signals and Systems
 - Communication Systems
 - Electric Circuits and Analysis
- Aug 2012 –** **Lecturer**
Dec 2012 Department of Electrical Engineering, Abasyn University Peshawar, Pakistan
- Courses taught.**

- Signals and Systems
- Communication Systems
- Electric Circuits and Analysis
- Electronics
- Electrical Measurement and Instrumentation

**June 2014-
Sept 2022**

Projects supervision (Undergraduate)

- Design of human activity recognition platform using USRP
- Developing a smart and portable healthcare system
- Smart kitchen garden watering system
- Automatic detection of modulation schemes using USRP
- Experimental implementation of cooperative network using USRP
- Implementation of OFDM Transceiver using USRP
- Enhancing Healthcare with Intelligent Wireless Sensing for Text Neck Syndrome
- Intelligent Frozen Gait Monitoring using Software Define Radio Frequency Sensing
- Enhanced Airport security system using intelligent non-contact sensing

**June 2021-till
date**

Research supervision (graduate)

- An experimental performance analysis of cooperative networks using USRP (Master)
- Intelligent Detection of Suspicious Liquids by Leveraging RF Sensing (Master)
- A Non-Invasive Smart Sensing of Text Neck Syndrome using SDR Technology (Master)
- An Intelligent Wireless Communication Sensing System to Prevent Bed Sore (Master)
- Intelligent Non-Invasive Indoor Localization System for Deaf using Software Defined Radio Technology (Master)
- Intelligent Non-Invasive RF Sensing for Health Abnormalities Using USRP (PhD)

Administrative Experience

**Sept 2023-till
date**

Department Coordination Officer

Department of Electrical and Computer Engineering, COMSATS University Islamabad, Pakistan

**Jan 2014-
Aug, 2018**

Program Coordinator Graduate Program

Department of Electrical and Computer Engineering, COMSATS University Islamabad, Pakistan

References

Dr. Xiaodong Yang (Professor)

School of Electronic Engineering, Xidian University, Xi'an, Shaanxi, China

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Dr. Najah AbuAli (Professor)

Assistant Dean for Students Affairs, College of Information Technology, UAE University

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