HASHIM RAZA KHAN

EXPERIENCE

2002- to Present: **NED University of Engineering & Technology, Karachi, Pakistan**

Associate Professor (2022- present)

- Teaches courses of Analog Integrated Circuits, VLSI Design, and post graduate courses related to electronics and machine learning.
- Co-Principal Investigator of Neurocomputation Lab, National Centre of Artificial Intelligence; responsible for the neuromorphic computing and machine learning group at the lab leading a team of 40+ researchers. Technical point of contact for multi-vendor RFIC EDA tool chain comprising of Cadence, AWR Microwave Office, and Sonnet tools. Also responsible for upgrade and maintenance of all EDA tools.
- Technical point of contact for all semiconductor process technologies available at NED University. This includes IBM (USA), TSMC (Taiwan), and SilTerra (Malaysia). These technologies are provided by Multi Project Wafer (MPW) run service providers MOSIS (USA), and SilTerra (Malaysia).
- Team member responsible for establishing Electronics Design Centre including design of facilities, equipment selection and procurement, etc.
- Lab In-charge of RF Lab at Electronics Design Centre.
- Project advisor for undergraduate projects related to RFIC design, Telecommunications, and embedded systems.
- Organized several seminars on Automation, Signal Processing, VLSI, Entrepreneurship, and career counselling by inviting speakers from academia and industry.
- Member of Board of Faculty of ECE at NED University.
- Member of Board of Studies at Electronic Engineering Department, NED University, IIEE, and Muhammad Ali Jinnah University (MAJU), Karachi
- Member Board of Review at Directorate Industrial Liaison (DIL), and ORIC, NED University
- Member of Departmental OBE Committee (DOBEC) responsible for the design and implementation of OBE and activities related to reaccreditation from PEC.
- Member of several committees at NED University for equipment purchase, software renewal, curriculum revision and evaluation of institutes affiliated with NED University.
- Member of reaccreditation Committee for IIEE and UIT on behalf of NED University.

Assistant Professor (2006- 2022)

- Taught courses of Basic Electronics, Integrated Circuits and VLSI Design at undergraduate and EDA Tools, Digital VLSI Design, Mechatronics, Analog VLSI Design, High Speed Semiconductor & Devices at graduate level.

Senior Manager Instrumentation Centre (Additional Charge) September 2014 - present)

- Successfully initiated and leading the effort to open instrumentation centre services for the industry since November 2014.

- The entire venture is running on bootstrap mode without any additional investment from the University. The instrumentation centre is providing calibration, training, repair, product design and miscellaneous technical services.
- Clients include FFBL, Telenor Pakistan, K-Electric, Ziafco, Dawlance, Otsuka Pakistan Ltd., HBL, Zor Chemicals, Saltek, Nestle Pakistan, Maritime Technologies Complex, Comsats Institute of Information Technology Islamabad, PAFKIET, UIT, etc.
- **Projects:**
  - Otsuka Pharmaceuticals: High Voltage Leak Detection Machine design for saline bottles
  - K Electric: Test jig design and fabrication for thermocouple cards of DCS at BQPS I power plant
  - HBL: Electrical, lighting, surveillance and fire protection systems design Mega warehouse, SITE, Karachi
- **Products:**
  - Instrux: Cloud based energy monitoring system with highly customizable business intelligence, compatible with most energy analysers
  - CHARM: An AI based analytics and prognostics tool for vehicle health monitoring and proactive maintenance.

Lecturer (2002-2006)

- Taught courses of Basic Electronics and Integrated Circuits.
- Laboratory In-charge of Power Electronics Laboratory.
- Testing and commissioning of equipment in Industrial Electronics and Power Electronics Laboratories.

Oct 05-May 06 **Infineon Technologies, Duisburg, Germany**

Master Thesis Student

- Worked as Master Thesis student on Design of RF Synthesizer in 65nm process technology for GSM SoC.
- Worked as student worker on the design of band gap reference voltage for GSM SoC in 65nm process technology.

Mar 05- Sep 05 **Agilent Technologies, Böblingen, Germany**

Internship

- Worked as intern with HSM R&D team. Tasks included designing a 320Mbps signal generator capable of supplying clock, PRBS and frequency sweep functionality for the FCal robot's calibration board. Other responsibilities included providing assistance for improvement in FCal measurement and processing the results.

2004-2005 **Aachen University of Technology (RWTH), Aachen, Germany**

Student Worker

- Worked as Student Worker at the Institute of Analog Circuits (IAS). Tasks included getting familiarized with Mentor Graphics ModelSim and implementing frequency divider, FIR filters in VHDL.
- Worked as Student Worker at the Institute of Communication Systems and Data Processing (IND) in the area of background noise suppression in speech signals.

- Worked as student worker at Comnets department in the area of adhoc networks for wireless communication

EDUCATION

2008-2014 **NED University of Engg. & Tech., Karachi, Pakistan**

PhD in Electronic Engineering collaborating with Linköping University, Sweden. PhD topic is "Flexible and Adaptive wideband switching power amplifiers for wireless transmitters."

2003-2006 **Aachen University of Technology (RWTH), Aachen, Germany**

M. Sc in Communications Engineering with grade 1.8 on German Scale (1.0 is best and 4.0 is worst).

1998-2002 **NED University of Engg. & Tech., Karachi, Pakistan**

BE in Electrical Engineering, remaining among the top 10 students of the Department of Electrical Engineering throughout the four years of study. Aggregate Percentage: 82% (A-1)

COURSES & TRAINING

Trainings Conducted

2019 **Radio Frequency Integrated Circuits Design, SUPARCO, Pakistan**

Three weeks hands-on training for SUPARCO engineers and managers for CMOS RFIC design

2016 **Introduction to Arduino, NED University**

A 16 hours entry level course for students and professionals conducted at Electronic Engineering department

2016 **Introduction to Printed Circuit Board Design**

A 16 hours entry level course for students and professionals conducted at Electronic Engineering department

2015 **Calibration principles & Techniques, Nestle Waters Factory, Port Qasim**

Two days hands-on corporate training for technical staff at Nestle Water factory

2015 **Refresher course in instrumentation and measurement technique for faculty, NED University, Pakistan**

Two days refresher course for the faculty of electronic engineering department

2014 **Practical aspects of Electronics, NED University, Pakistan**

Eight days winter school for undergraduate students to familiarize them with optimal use of instrument and best practices in electronic circuit design.

Courses & Trainings Attended

2018 **Certified Professional by SPPRA & NED University Procurement**

Attended five days training course on procurement procedure in public sector organizations, organized by Centre of Professional Education (CoPE), NED University.

2016 **Entrepreneurship Workshop by CED, IBA Karachi**

Attended two days workshop on Entrepreneurship by Centre for Entrepreneurial Development by IBA, Karachi.

2015 **Satellite Design Workshop by SUPARCO, Lahore, Pakistan**

Attended three days' workshop on student satellite design challenges and methodologies.

2014 **Indigenous On-campus Training IOT programme, Karachi, Pakistan**

Attended five days training programme for various aspects of non-academic departments in University organized by IBA, Karachi and sponsored by HEC.

2012 **ICT Business Plan Development & Global Sales Strategies for Pakistani Entrepreneurs, Islamabad, Pakistan**

Attended five days training workshop on entrepreneurial skill development by Kenneth P. Morse, Founding Editor MIT Enterprise Forum and Cambridge Advisors Network.

2011 **RF Analog IC Design, EPFL, Lausanne, Switzerland.**

Attended five days course on RFIC Design by Mead Education S.A.

2009 **EDA Tools Training, Singapore**.

Attended two weeks training for Mentor Graphics IC and PCB design tools by Mentor Graphics Inc.

2006 **LabVIEW and Instrumentation Training, NED University, Karachi, Pakistan**

Attended ten days project-based training of LabVIEW by Assoc. Prof. Uvais Qidwai, Qatar University, Qatar

SKILLS

- IC design, simulation and synthesis in Cadence Virtuoso, Mentor Graphics, Microwave Office and ADS.
- RF and digital PCB design in ADS, Eagle and OrCAD.
- EM simulations in Sonnet, Axiem and Momentum.
- Test and measurement of RF front end blocks for wireless communication systems.
- Programming in C, Verilog, VHDL
- Circuit simulation in LINMIC, OrCAD, SWCAD and variants.
- Simulation in MATLAB and NS-2
- Knowledge of Windows, Unix and Linux operating systems.
- Proficient in MS Office and LaTeX
- Fluent in English and Urdu, basic knowledge of German.

CONTACT INFORMATION

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Webpage:	https://edc.neduet.edu.pk/detail_hrk.html

RESEARCH STUDENTS

PhD		M. Engg.	
Graduated: 1	**In-Progress:** 2	**Graduated:** 6	**In-Progress:** 1

RESEARCH GRANTS & FUNDING

2022-24

- Principal Investigator for the project "Indigenous Development of Magnetometers for Geomagnetic Field Monitoring," approved for funding by National Centre for GIS & Space Applications (NCGSA), amounting to Rs. 11.897 million.
- Co-Principal Investigator for the project "De-burdening healthcare support via fully automated point-of-care screening process for diabetic retinopathy," approved for funding by HEC NRPU, amounting to Rs. 4.686 million.

2022-25

- Co-Principal Investigator for the project "Xcelerium: Edge computing processor design" approved for funding by Xcelerium Inc, USA, amounting to Rs. 60 million.
- Co-Principal Investigator for the project "Technology Enabled Performance Monitoring and Virtual Digitization of CPEC Infrastructure for Sustainable Maintenance Decision-Making," approved for funding by HEC CPEC Collaborative Research Grant (CPEC-CRG), amounting to Rs. 36.91 million.
- Co-Principal Investigator for the project "SolarPlas – Solar powered atmospheric plasma system for the treatment of contaminated wastewater," approved for funding by University of Padova, Italy, amounting to 21,000 Euros

2021

- Principal Investigator for the project "Intelligent Prognostics and Machine Health Management System" approved for funding by Quality Vertex Integrated System Engineering Pvt, Ltd. amounting to Rs. 0.6 million.

2021-2023

- Co-Principal Investigator for the project "CONSOLE: Machine Vision Based Industrial Inspection System for Quality Assurance" approved for funding by HEC Technology Transfer Support Fund (TTSF) amounting to Rs. 9 million.

2021-

- Co-Principal Investigator for the project "EV System Development" approved for funding by AI Mobility & Green Energy LLC, USA amounting to Rs. 21 million approx. The first design is not in pilot production phase.

2021-2022

- Co-Principal Investigator for the project "IoT Ceiling Fan System Design" approved for funding by Tamoor Fans Ltd. amounting to Rs. 1.15 million.
- Principal Investigator for the project "RoboDoc: A social robot to protect healthcare professionals dealing in contagious diseases" approved for funding by National Centre for Robotics & Automation Research Fund amounting to Rs. 12 million.

- Co-Principal Investigator for the project "Artificial intelligence as a pathway to reduce industrial Downtime cost through hybrid predictive maintenance (ADVICE)" approved for funding by National Centre of Artificial Intelligence Research Fund amounting to Rs. 13.15 million.

2020-2022

- Co-Principal Investigator for the project "AI based diagnosis of Diabetic Retinopathy" approved for funding by A-Eye Diagnostics (Pvt) Ltd, Karachi amounting to Rs. 1.32 million.

2020

- Co-Principal Investigator for the project "COVID-19 GIS based Intelligent Decision Support System for Province of Sindh" approved for funding by The World Bank amounting to Rs. 6.4 million.
- Principal Investigator for project "Car Health Prediction Monitoring (CHARM)" funded by M/s FS Technology Solutions (Pvt) Ltd amounting to Rs. 1 million approximately.

2019-2022

- Co-Principal Investigator for project "Fabric based soft actuators for wearable applications" jointly funded by Tubitak, Turkey and PSF, Pakistan amounting to Rs. 5.78 million

2018-2021

- Co-Principal Investigator for Neuro-computation lab which is part of National Centre for Artificial Intelligence (NCAI) established by Planning Commission of Pakistan and HEC Pakistan as a cluster of six Pakistani Universities with a dedicated funding of Rs. 70 million.

2018-2020

- Principal Investigator for HEC TDF funded 2 years project titled "Low Cost Assistive Robots for Differently Abled Children & General Use" jointly funded by HEC TDF and M/s Trax Logic amounting to Rs. 9 million approx.

2018-2020

- Co-Principal Investigator for HEC TDF funded 2 years project titled "Intelligent Energy Efficient Fans for Home and Commercial Users" jointly funded by HEC TDF and M/s Mehran Electrons Company amounting to Rs. 10.2 million approx.

2017-2019

- Co-Principal Investigator for HEC NRPU funded 2 years project titled "3D indoor modelling and classification for structured environments" amounting to Rs. 2.81 million approx.

2012-2014

- Co-Principal Investigator (later Principal investigator) for Research Project "Flexible, Reconfigurable and Power Adaptive Power Amplifiers for wireless Communication" funded by ICT R&D Fund. This three-years project is the first project funded by ICT R&D Fund at a public sector University in Sindh (Rs. 14 million approximately).

2012-2014

- HEC Travel Grants to present research papers at conferences in USA and Singapore.

2008-2012

- PhD funding from NED University Research Fund (Rs. 21 million).

PUBLICATIONS

JOURNALS

1. M. Kazmi, M. T. Shoaib, A. Aziz, **H. R. Khan**, S. A. Qazi, "An Efficient IIoT-Based Smart Sensor Node for Predictive Maintenance of Induction Motors," ***Computer Systems Science & Engineering***, Vol. 47 Issue 1, p255-272, 2023, https://doi.org/10.32604/csse.2023.038464

2. **H. R. Khan**, M. H. b Khalid, U. Alam, M. Atiq, U. Qidwai, S. A. Qazi, "Dataset of usage pattern and energy analysis of an Internet of Things-enabled ceiling fan," ***Data in Brief***, Volume 46, 2023, 108900, https://doi.org/10.1016/j.dib.2023.108900

3. **H. R. Khan**, I. Haura, Riazuddin, "RoboDoc: Smart Robot Design Dealing with Contagious Patients for Essential Vitals Amid COVID-19 Pandemic," ***Sustainability***, 15(2), 1647, 2023. https://doi.org/10.3390/su15021647

4. H. Shahid, M. A. Hasan, O. Ejaz, **H. R. Khan**, M. Idress, M. Ashraf, and S. A. Qazi, "The severity of Depression, Anxiety, and Stress: Recommendations from joint work of research center and psychology clinics in COVID-19 Pandemic," ***Frontiers in Psychiatry***, 1152, 2022. https://doi.org/10.3389/fpsyt.2022.839542

5. M. Kazmi, **H. R. Khan**, M. H. B. Khalid and S. A. Qazi, "Threefold optimized forecasting of electricity consumption in higher education institutions," ***Computers, Materials & Continua***, vol. 73, no.2, pp. 2351–2370, 2022. https://doi:10.32604/cmc.2022.026265

6. A. Mustafa, M. Kazmi, **H. R. Khan**, S. A. Qazi, S. H. Lodi, "Towards a Carbon Neutral and Sustainable Campus: Case Study of NED University of Engineering and Technology," ***Sustainability***, 14(2), 794, 2022.. https://doi.org/10.3390/su14020794

7. S. M. Faraz, S. R. N. Jafri, **H. R. Khan**, W. Shah, N. H. Alvi, Q. Wahab, O. Nur, "Effect of annealing temperature on the interface state density of n-ZnO nanorod/p-Si heterojunction diodes," ***Open Physics***, vol. 19, no. 1, pp. 467-476, 2021. https://doi.org/10.1515/phys-2021-0053

8. **H. R. Khan**, M. Kazmi, H. B. Ashraf, H. B. Khalid, A. Hasan, S. A. Qazi, "An Isolated Power Factor Corrected Cuk Converter with Integrated Magnetics for Brushless DC Ceiling Fan Applications," ***Electronics***, 10(14), 1720, July 2021. https://doi.org/10.3390/electronics10141720

9. **H. R. Khan**, A. Hasan, M. Kazmi, S. A. Qazi, "A Holistic Approach to Urdu Language Word Recognition Using Deep Neural Network", in ***Journal of Engineering, Technology & Applied Science Research,*** pp. 7140-7145, Volume: 11, No. 3, June 2021. https://doi.org/10.48084/etasr.4143

10. A. Hasan, H. Shahid, **H. R. Khan**, S. A. Qazi, M. Fraser, "Distinguishing Voluntarily Upregulation of Localized Central Alpha from Widespread Posterior Alpha," in ***Applied Psychophysiology and Biofeedback***, pp. 1-12, 2021. https://doi.org/10.1007/s10484-021-09511-5

11. Uddin R, A. J. Shaikh, **H. R. Khan**, M. A. Shirazi, A. Rashid, and S. A. Qazi, "Renewable Energy Perspectives of Pakistan and Turkey: Current Analysis and Policy Recommendations," ***Sustainability,*** 13(6), 3349, 2021. https://doi.org/10.3390/su13063349

12. Uddin R, **H. R. Khan**, Arfeen A, Shirazi MA, Rashid A, Shahbaz Khan U. "Energy Storage for Energy Security and Reliability through Renewable Energy Technologies: A New Paradigm for Energy Policies in Turkey and Pakistan." ***Sustainability,*** 13(5), 2823, 2021. https://doi.org/10.3390/su13052823

13. M. Kazmi, A. Aziz, **H. R. Khan**, S. A. Qazi and L. Stergioulas, "Resource-Efficient Image Buffer Architecture for Neighborhood Processors," in ***IEEE Access*** 2020*,* doi: https://doi.org/10.1109/ACCESS.2020.3025344

14. A Shabbir, **H. R. Khan**, S. A. Ali, S. Rizvi , 'Design and Performance Analysis of Multi-tier Heterogeneous Network through Coverage, Throughput and Energy Efficiency' ***Journal of Engineering, Technology & Applied Science Research***, pp. 2345-50, Vol. 7, No. 6, December 2017, https://doi.org/10.48084/etasr.1256

15. A. Shabbir, **H. R. Khan**, S. A. Ali, S. Rizvi, "A Stochastic Geometrical Approach for Performance Analysis of Heterogeneous Cellular Network," ***International Journal of Computer Science & Information Security***, pp. 467-475, Vol. 14, No. 8, August 2016,

16. **H. R. Khan**, A. R. Qureshi, F. Zafar, Q. Wahab, "Design of a Broadband Current Mode Class-D Power Amplifier with Harmonic Suppression," ***Journal of Analog Integrated Circuits and Signal Processing***, 89, 15–24 2016. https://doi.org/10.1007/s10470-016-0796-z

17. **H. R. Khan**, J. Fritzin, A. Alvandpour, Q. Wahab, "A Parallel Circuit Differential Class-E Power Amplifier Using Series Capacitance," ***Journal of Analog Integrated Circuits & Signal Processing*** , **75,** 31–40, 2013. https://doi.org/10.1007/s10470-013-0036-8

18. A. R. Qureshi, **H. R. Khan** and Q. Wahab, "High Efficiency Switching Classes RF Power Amplifiers in Wireless Communication," ***NED University Journal of Research (Thematic Issue on Energy)***, January 2012

CONFERENCES

1. M. Kazmi, B. Hafeez, **H. R. Khan**, S. A. Qazi, "Machine-Vision-Based Plastic Bottle Inspection for Quality Assurance," Eng. Proc. 2022, 20, 9. https://doi.org/10.3390/engproc2022020009

2. R. u. N. J. Syed, H. Amjad, M. Sultan and **H. R. Khan**, "Low Cost 2D Laser Scanner Based Indoor Mapping and Classification System," 2019 International Conference on Robotics and Automation in Industry (ICRAI), Rawalpindi, **Pakistan**.

3. S. Moin, U. Zafar, Z. Haider, S. Khan, A. Khan and **H. R. Khan**, "A High Gain Amplifier Design for Neural Signal Acquisition," 2019 International Conference on Electrical, Communication, and Computer Engineering (ICECCE), 2019, Swat, **Pakistan**.

4. A. Durrani, M. Khurram, **H. R. Khan**, "Smart Weather Alert System for Dwellers of Different Areas," 16th IEEE IBCAST, January 2019, Islamabad, **Pakistan**

5. A. Shabbir, **H. R. Khan** and S. Abbas Ali, "A Traffic Load Aware Approach for Optimum Throughput in 5G Heterogeneous Cellular Networks," 4th International Conference on Computer and Information Sciences (ICCOINS), pp. 1-6, 2018, Kuala Lumpur, **Malaysia.**

6. A. Shabbir, **H. R. Khan**, and Syed Abbas Ali. "Outage analysis of two-tier heterogeneous cellular network with sleep strategies." IEEE International Conference on Circuits, System and Simulation (ICCSS), pp. 138-141, 2017, London, **UK**.

7. I. Jaffri, U. A. Siddiqui, F. Hadi, **H R. Khan**, "Evaluation of SilTerra's 130nm CMOS Radio Frequency Integrated Circuit (RF IC) Technology for Power Amplifier," 1st International Electrical Engineering Congress, May 13-14, 2016, Karachi, **Pakistan.**

8. H. Rana, S. Zehra, A. Sahar, S. Nazir, **H. R. Khan**, "Kinect Based Edutainment System For Autistic Children," 1st International Electrical Engineering Congress, May 13-14, 2016, Karachi, **Pakistan.**

9. **H. R. Khan**, A. R. Qureshi, F. Zafar, Q. Wahab, PWM with Differential Class-E Amplifier for Efficiency Enhancement at Back-Off Power Levels," 57th IEEE MidWest Symposium on Circuits & Systems (MWSCAS), August 3-6, 2014, College Station, Texas, **USA.**

10. **H. R. Khan**, A. R. Qureshi, F. Zafar, Q. Wahab, "Design of a Broadband Current Mode Class-D Power Amplifier with Harmonic Suppression," 12th IEEE International NEWCAS, June 22-25, 2014, Trois-Rivières, **Canada.**

11. **H. R. Khan**, U. Sajid, S. Kanwal, F. Zafar, Q. Wahab, "A Fully Integrated Distributed Active Transformer Based Power Amplifier in 0.13 μm CMOS Technology," 2nd Saudi International Conference on Electronics, Communications & Photonics, 2013, Riyadh, **Saudi Arabia.**

12. F. Zafar, A. R. Qureshi, **H. R. Khan,** and Q. Wahab, "Eliminating tie-down diodes in process technologies," *INMIC*, 2013, pp. 110-114, Lahore, **Pakistan.**

13. **H. R. Khan**, F. Zafar, A. R. Qureshi, and Q. Wahab, "Sonnet EM Simulation of High-Power Transformers for RF Power Amplifiers," The 28th International Review of Progress in Applied Computational Electromagnetics, April 10-14, 2012, Columbus, Ohio, **USA**.

14. **H. R. Khan**, A. R. Qureshi, and Q. Wahab, "A Fully Integrated Class-E Power Amplifier in 0.13um CMOS Technology," 9th IEEE International NEWCAS 2011, June 26-29, 2011, Bordeaux, **France**.

15. **H. R. Khan** and Q. Wahab, "A 24 GHz Class-A Power Amplifier in 0.13um CMOS Technology," International Conference on Solid State and Integrated Circuits, March 11-13, 2011, Shanghai, **China**.

16. F. Zafar, H. Abid, J. Ahmed, **H. R. Khan**, R. Ramzan and Qamar-ul-Wahab, "Design of a highly linear 900MHz single ended LNA in 0.35μm CMOS technology," 2010 IEEE Conference on Sustainable Utilization and Development in Engineering and Technology, 2010, pp. 127-130, Kuala Lumpur, **Malaysia**.

17. **H. R. Khan**, J. Fritzin, A. Alvandpour, Q. Wahab, "A 900 MHz 26.8 dBm Differential Class-E CMOS Power Amplifier," IEEE 5th German Microwave conference, March 15-17, 2010, Berlin, **Germany**.