Muhammad Akmal Chaudhary

Academic Rank

Associate Professor

Qualifications

- **MBA Leadership and Corporate Governance** **Heriot-Watt University (2021 – 2022)**

  Thorough understanding of cornerstone business disciplines such as entrepreneurship and creativity, economics for business, developing and executing strategy, financial decision making, strategic marketing, organisational behaviour, leadership practices, digital competitive strategy, corporate governance, delivering successful projects, and strategic leadership and management.

- **PhD Electrical and Electronic Engineering** **Cardiff University (2008 – 2011)**

  Significant accomplishments include:

  - High power (up to 120W) device characterisation using modulated active fundamental and harmonic load pull of GaN devices
  - Memory effects investigations to measure the sensitivity of power devices to electrical memory which is the major contributor to overall baseband memory of microwave devices
  - Development of an envelope tracking (ET) based design procedures for spectrum-efficient power amplifiers
  - Package and device parasitic modelling of high power LDMOS and GaN devices using s-parameter measurements to allow for waveform de-embedding in high power devices
  - Optimisation of high-power devices for high efficiency modes of operation using package and device de-embedding for GaN devices
  - This work had been carried out in collaboration with Bristol University and resulted in 18 peer reviewed international papers

  The doctoral research focus had primarily been on developing the modulated waveform measurement system for the characterisation of high-power microwave transistors and measurements of power amplifiers. The work utilised the enhanced unique high power modulated active harmonic modulated load pull system to emulate specific power amplifier modes and architectures, and the subsequent waveform characterisation of microwave power devices operating in these complex and often dynamic impedance environments. It had not been previously possible to fully control and engineer out-of-band impedance environment at baseband and RF simultaneously. By developing successful multi-tone measurement techniques, the research work had allowed for robust characterisation of non-linear microwave devices when driven by broadband multi-tone stimuli. For instance, emulation of class J impedance environment under modulated excitation interestingly highlighted the presence of separate optimum baseband impedance conditions for the reduction of individual intermodulation (IM) products and adjacent channel power ratios.

  The use of envelope domain analysis offered an alternate approach to expose device related problematic effects and involved plotting the dynamic behaviour of gain, output power, efficiency and other key performance parameters in response to a rapidly changing modulation envelopes. These measures offered quite intuitive and far more representative behaviour of microwave devices whilst being operated within a realistic, application specific environment.

Research field(s)

- Design of radio frequency and microwave passive and active components.
- Large Signal Network Analyzer (LSNA) based waveform engineering and measurements.
- Power transistor nonlinear multi-harmonic characterization for Power Amplifier (PA) design.
- Modulated source-pull and load-pull waveform measurements on GaN HEMT, GaAs and LDMOS devices.

Publications *(Last five years)*

- N. N. Anandakumar, M. Hashmi, M. A. Chaudhary, *"Implementation of Efficient XOR Arbiter PUF on FPGA with Enhanced Uniqueness and Security"*, IEEE Access, Vol. 10, December, 2022, pages: 129832 - 129842.
- A. Aidakhmetov, K. Dautov, M. A. Chaudhary, M. Hashmi, *"Development of High Performance Dual-Band Millimeter Wave Elliptic Patch-based Antenna"*, in Proc. of IEEE Microwave, Antennas, and Propagation Conference (MAPCON), December, 2022, pages: 1-3.
- M. H. Ashfaq, Z. A. Memon, M. A. Chaudhary, M. Talha, J. Selvaraj, N. Rahim, M. M. Hussain, *"Robust Dynamic Control of Constant-Current-Source-Based Dual-Active-Bridge DC/DC Converter Used for Off-Board EV Charging"*, Energies, Vol. 15, No. 23, November, 2022, pages: 8850-8887.
- S. Shahzad, M. A. Abbasi, M. A. Chaudhary, M. M. Hussain, *"Model Predictive Control Strategies in Microgrids: A Concise Revisit"*, IEEE Access, Vol. 10, November, 2022, pages: 122211 - 122225.
- S. I. Yahya, B. M. Alameri, M. Jamshidi, M. A. Chaudhary, G. K. Ijemaru, Y. S. Mezaal, S. Roshani, *"A New Design Method for Class-E Power Amplifiers using Artificial Intelligence Modeling for Wireless Power Transfer Applications"*, Electronics, Vol. 11, No. 21, November, 2022, pages: 3608-8025.
- Z. Kudaibergenova, A. Toibekkyzy, K. Dautov, M. A. Chaudhary, M. Hashmi, *"Employment of Planar Coil and DGS based Resonators for Hybrid WPT System Realization"*, in Proc. of IEEE 65th International Midwest Symposium on Circuits and Systems (MWSCAS), August, 2022, pages: 99-102.
- K. Dautov, M. S. Hashmi, N. Nasimuddin; M. A. Chaudhary, G. Nauryzbayev, *"Quantifying the Impact of Slow Wave Factor on Closed-Loop Defect-Based WPT Systems"*, Vol. 71, No.6, June, 2022, pages:1-10.
- D. Rano, M. S. Hashmi, A. A. Yelizarov, M. A. Chaudhary, *"Analysis of Normally Incident EM Waves Reflected from a Conformal Meta-Surface"*, in Proc. of 16th IEEE European Conference on Antennas and Propagation (EuCAP), March, 2022, pages: 321-325.
- P. Pec , S. Kim, D. Lee, M. A. Chaudary, Y. Jeong, *"The Design of Class-F Power Amplifier by Using Asymmetrical Composite Right-/Left-handed Transmission Line",* Progress in Electromagnetic Research (PIER), February, 2022, pages: 1-4.
- G. Chaudhary, D. Lee, M. A. Chaudary, Y. Jeong, *"Quasi-Reflectionless Differential Phase Shifter with Arbitrary Prescribed Group Delay and Flat Phase Difference",* in Proc. of IEEE 51st European Microwave Conference (EuMC), February, 2022, pages: 1-4.
- S. Husain, K. Begaliyeva, A. Aitbayev, M. S. Hashmi, M. A. Chaudhary, *"Decision Tree Based Small-Signal Modelling of GaN HEMT and CAD Implementation"*, in Proc. of 40th IEEE International Conference on Consumer Electronics (ICCE 2022), January, 2022, pages: 67-72.
- S. Husain, M. Hashmi, A. H. Jarndal, M. A. Chaudhary, G. Nauryzbayev, *"Comparative Analysis of ANN Architectures for the Development of GaN HEMT Small-Signal Model",* in Proc. of IEEE MTT-S International Microwave and RF Conference (IMaRC 2021), December, 2021, pages: 251-257.
- Z. Kudaibergenova, K. Dautov, M. Hashmi, M. A. Chaudhary, *"Utilization of Meander Line Slots for Enhancing the WPT Efficiency and Transmission Range",* in Proc. of IEEE Asia Pacific Microwave Conference (APMC), December, 2021, pages: 588-590.
- H. Khalid, S. J. Hashim, S. Mumtazah, F. Hashim, M. A. Chaudhary, *"A Lightweight and Secure Online/Offline Cross-domain Authentication Scheme for VANET Systems in Industrial IoT",* PeerJ Computer Science, Vol. 7, No. 9, December, 2021, pages: 12746 – 12778.
- H. Khalid, S. J. Hashim, S. Mumtazah, F. Hashim, M. A. Chaudhary, *"Secure Real-time Data Access Using Two-Factor Authentication Scheme for the Internet of Drones*", in Proc. of 19th IEEE Student Conference on Research and Development (SCOReD), November, 2021, pages: 27-32.

- H. Khalid, S. J. Hashim, S. Mumtazah, F. Hashim, M. A. Chaudhary, *"A New Hybrid Online and Offline Multi-factor Cross-Domain Authentication for IoT Applications in Automotive Industry",* Energies, Vol. 14, No. 19, November, 2021, pages: 6349-6386.
- H. Khalid, S. J. Hashim, S. Mumtazah, F. Hashim, M. A. Chaudhary, *"Robust Multi-gateway Authentication Scheme for Agriculture Wireless Sensor Network in Society 5.0 Smart Communities",* Agriculture, Vol. 11, No. 10, October, 2021, pages: 881-916.
- A. Saxena, M. Hashmi, D. Banerjee, M. A. Chaudhary, *"Theory and Design of a Flexible Two-Stage Wideband Wilkinson Power Divider"*, Electronics, Vol. 10, No. 7, September, 2021, pages: 790-819.
- K. Dautov, Z. Kudaibergenova, M. Hashmi, G. Nauryzbayev, M. A. Chaudhary, *"Analysis and Experimental Validation of Circularly Slotted Near-Field WPT Systems",* in Proc. of 64th IEEE International Midwest Symposium on Circuits and Systems (MWSCAS), August, 2021, pages: 436-441.
- D. Iqbal, M. Siddique, M. A. Chaudhary, M. K. Bhatti, A. S. Malik, M. Abrar, M. Hussain, *"Novel Concept of Reducing OVR at the Output of SEPIC Converter using Programmable Capacitors",* International Journal on Electrical Engineering and Informatics, Vol. 13, No. 2, June, 2021, Pages: 477-494.
- K. Dautov, M. Hashmi, G. Nauryzbayev, N. Nasimuddin, M. A. Chaudhary, *"Compact Multi-Frequency System Design for SWIPT Applications"*, International Journal of RF and Microwave Computer-Aided Engineering, Vol. 31, No. 6, June, 2021, Pages: 22632-22643.
- D. Kupreyev, K. Dautov, M. Hashmi, M. A. Chaudhary, *"High-Performance Planar Hexagonal Coil-Type Wireless Power Transfer System",* in Proc. of 3rd IEEE Latin America Microwave Conference (LAMC), May, 2021, pages: 257-260.
- S. Husain, A. Khusro, M. S. Hashmi, G. Nauryzbayev, M. A. Chaudhary, *"Demonstration of CAD Deployability for GPR Based Small-Signal Modelling of GaN HEMT"*, in Proc. of IEEE International Symposium on Circuits and Systems (ISCAS), May, 2021, 456-460.
- H. Khalid, S. J. Hashim, S. Mumtazah, F. Hashim, M. A. Chaudhary, "*Cross-SN: A lightweight Authentication scheme for a Multi-server platform using IoT-based Wireless Medical Sensor Network*", Electronics, Vol. 10 No. 7, March, 2021, pages: 790-806.
- H. Khalid, S. J. Hashim, S. Mumtazah, F. Hashim, M. A. Chaudhary, "*A New Secure and Lightweight Multi-Factor Authentication Scheme for Cross-Platform Industrial IoT Systems*", Sensors, Vol. 21 No. 4, February, 2021, pages: 1428-1259.
- S. Husain, A. Khusro, M. S. Hashmi, G. Nauryzbayev, M. A. Chaudhary, *"Gaussian Process Regression for Small-Signal Modelling of GaN HEMTs"*, in Proc. of 39th IEEE International Conference on Consumer Electronics (ICCE 2021), *January, 2021,* pages: 221-224.
- R. Gupta, M. A. Chaudhary, M. S. Hashmi, *"Dual-Frequency Out-Of-Phase Power Divider with Integrated Impedance Transformation"*, in Proc. of IEEE Asia Pacific Microwave Conference (APMC), *December, 2020, pages: 923-925.*
- Z. Iman, K. Dautov, M. S. Hashmi, M. A. Chaudhary, *"Symmetrically Slotted Ground Defected UWB Antenna Configurations for Microwave Imaging Techniques"*, in Proc. of IEEE Asia Pacific Microwave Conference (APMC), December, 2020, pages: 825-827.
- D. Rano, M. S. Hashmi, M. A. Chaudhary, A. A. Yelizarov, *"Miniaturized Slot-Loaded Mushroom EBG Cell for MBAN and Wi-Fi Bands"*, in Proc. of IEEE Asia Pacific Microwave Conference (APMC), December, 2020, pages: 145-147.
- H. Khalid, S. J. Hashim, S. Mumtazah, M. A. Chaudhary, *"New and Simple Offline Authentication Approach Using Time-Based One-Time Password with Biometric for Car Sharing Vehicles*", in Proc. of 7th IEEE Asia-Pacific Conference on Computer Science and Data Engineering (CSDE), December, 2020, pages: 50-56.
- H. Khalid, S. J. Hashim, S. Mumtazah, M. A. Chaudhary, "Security and Safety of Industrial Cyber-Physical System: Systematic Literature Review", Journal of Archaeology, Vol.17, No. 9, November, 2020, pages: 1592-1620.
- Z. Kudaibergenova, K. Dautov, G. Nauryzbayev, M. S. Hashmi, M. A. Chaudhary, *"Slot-Dependent Wireless Power Transfer System for MBAN Applications"*, in Proc. of 10th IEEE International Conference on Consumer Technology (ICCE-Berlin), *November, 2020, pages: 74-77.*
- N. Hadi, Z. Yusoff, M. Sadeque, S. J. Hashim, M. A. Chaudhary,*"High Flat Gain over an Octave Bandwidth Class F RF Power Amplifier Design Using 10W GaN HEMT*", Bulletin of Electrical Engineering and Informatics (BEEI), Vol 9, No. 5, October, 2020, pages:71-78.
- R. Gupta, M. S. Hashmi, M. A. Chaudhary, *"Flexible Design Scheme for a Simple Dual-band Ultra-high Impedance Transformer and its Application in a Balun"*, IEEE Access, Vol. 8, July 2020, pages: 125745 – 125754.
- M. A. Chaudhary, *"An Envelope Domain Probe into Nonlinear Behaviour of a High Frequency Power Transistor"*, in Proc. of 14th IEEE International Conference on Semiconductor Electronics (ICSE), *July, 2020, pages: 37-40.*
- M. M. Hussain, Z. A. Memon, M. A. Chaudhary, M. Siddique "*An Innovative PID Controller in Conjunction with DC Electric Motor for Control Hybrid Electric Vehicle"*, International Journal of Electrical and Electronics Engineering (IJEEE), Vol.7, No.7, July, 2020, pages: 20-34.
- D. Rano, M. A. Chaudhary, M. S. Hashmi, *"A New Model to Determine Effective Permittivity and Resonant Frequency of Patch Antenna Covered with Multiple Dielectric Layers"*, IEEE Access, Vol. 8, No.1, February, 2020, pages: 34418 – 34430.

- M. M. Hussain, M. A. Chaudhary, A. Razaq, "*Mechanism of Saline Deposition and Surface Flashover on High-Voltage Insulators near Shoreline: Mathematical Models and Experimental Validations"*, Energies, Vol. 12, No. 19, September 2019, Pages: 3685-3705.
- M. M. Hussain, M. Al Rashid, M. A. Chaudhary, A. Razaq, "*Design and Implementation of Hybrid Vehicle using Control of DC Electric Motor"*, in Proc. of 54th IEEE International Power Engineering Conference, September, 2019, pages:243-248.
- M. A. Chaudhary, Z. Yusoff, J. Lees, J. Benedikt, P. Tasker, *"Auxiliary Envelope Tracking Focused Investigations of a 10W GaN HEMTs Device"*, in Proc. of IEEE International Conference on Circuits, Systems and Devices*, September, 2019, pages: 1-5.*
- M. A. Chaudhary, *"Sampling of Complex Modulated Stimuli using Digital Sampling Oscilloscope",* International Journal of *Microwave and Optical Technology (IJMOT), Vol. 14, No. 3, May 2019, pages: 145-152.*
- M. A. Chaudhary, *"Sensitivity of Microwave Power Transistors to Low Frequency Impedance Variations"*, in Proc. of 6th IEEE International Conference on Electrical and Electronic Engineering (ICEEE), April, 2019, pages: 87-90.

Courses Taught *(Last five years)*

- **Fall 2022 – 2023**
  BME301 — Microcontrollers & Computer Interface
  ELE451 — Communication Switching and Networks
  ELE303 — Electromagnetic Fields & Wave Propagation
- **Spring 2021 – 2022**
  ELE456 — Telecommunication Systems
  ELE314 — Microcontrollers and Applications
  ELE483 — Computer Based Instrumentation & Control
- **Fall 2021 – 2022**
  ELE452 — Digital Communication
  ELE451 — Communication Switching and Networks
  ELE303 — Electromagnetic Fields & Wave Propagation
  ELE483 — Computer Based Instrumentation & Control
- **Spring 2020 – 2021**
  ELE453 — Microwave Engineering
  ELE314 — Microcontrollers and Applications
  ELE483 — Computer Based Instrumentation & Control
- **Fall 2020 – 2021**
  ELE446 — Directed Study in Communication
  BME301 — Microcontrollers & Computer Interface
  ELE303 — Electromagnetic Fields & Wave Propagation
  ELE483 — Computer Based Instrumentation & Control
- **Spring 2019 – 2020**
  ELE456 — Telecommunication Systems
  ELE314 — Microcontrollers and Applications
  ELE446 — Directed Study in Communication
- **Fall 2019 – 2020**
  BME301 — Microcontrollers & Computer Interface
  ELE303 — Electromagnetic Fields & Wave Propagation
  ELE483 — Computer Based Instrumentation & Control
- **Spring 2018 – 2019**
  214 322 — Instrumentation and Measurements
  212 456 — Communication Switching and Networks

- **Fall 2018 – 2019**
  212 333 — Microprocessors & Microcontrollers
  212 385 — Electromagnetic Fields & Wave Propagation

Professional Experience

- **Associate Professor** **Ajman University (2018 to date)**

  Have been working as an Associate Professor of Electrical Engineering. Involved heavily in teaching a variety of electrical engineering related courses and committees works. Too, engaged in developing design methodologies for multi-band and multi-tone RF and microwave circuits and systems for modern communication systems.

- **Assistant Professor** **Ajman University (2012 to 2018)**

  Worked as an Assistant Professor of Electrical Engineering. Taught various course of Electrical Engineering and helped students to maximise their talents by assigning them cutting edge research topics as capstone project in the broad field of Electrical Engineering.

- **Postdoctoral Research Associate** **Cardiff University (2011– 2012)**

  Worked as a postdoctoral research associate at the Agilent Centre for High Frequency Engineering, where I was engaged in developing advanced microwave instrumentation such as multi-tone load-pull and waveform measurement setups and multi-tone measurement techniques for power transistor characterisation and power amplifier measurements under multi-tone excitations. And efficiently executed commercial work for various companies.

Committees Work

- Member, Student Activities Committee, IEEE, United Arab Emirates (2016- to date)
- Member, College Effectiveness Committee, College of Engineering, Ajman University, United Arab Emirates (2018-(2023)
- Chair, Assessment and Continuous Improvement Committee, Department of Electrical Engineering, Ajman University, United Arab Emirates (2018-2023)
- Chair, IEEE Students Activities Committee, Department of Electrical Engineering, Ajman University, United Arab Emirates (2017-2021)
- Chair, Research Committee, Department of Electrical Engineering, Ajman University, United Arab Emirates (2016-2018)
- Member, Research Committee, College of Engineering, Ajman University, United Arab Emirates (2016-2018)
- Chair, Basic Sciences Committee, Department of Electrical Engineering, Ajman University, United Arab Emirates (2015-to date)
- Member, Curriculum Committee, Department of Electrical Engineering, Ajman University, United Arab Emirates (2016-to date)
- Coordinator, Electrical Engineering Undergraduate Projects, Department of Electrical Engineering, Ajman University, United Arab Emirates (2017-2023)
- Secretary, Departmental Council, Department of Electrical Engineering, Ajman University, United Arab Emirates (2012-2022)
- Chair, Laboratory Committee, Department of Electrical Engineering, Ajman University, United Arab Emirates (2012 – 2017)
- Coordinator, Ajman University Re-branding Project, College of Engineering, Ajman University, United Arab Emirates (2016 - 2017).
- Head, Telecommunication Engineering Research Cluster, Innovation Centre Ajman, Ajman University, United Arab Emirates (2016 - 2017).

Honors and Awards

- Heriot-Watt University Bicentennial award.
- Engineering and Physical Sciences Research Council (EPSRC) fellowship.
- Young Researcher Grant.
- Cardiff School of Engineering Postgraduate Research Studentship award.
- IEEE Young Engineer Prize.
- MSc in Electronic Engineering with the highest accolade Distinction.
- Lion Laboratories Prize for best project in MSc Electronic Engineering.
- Best Examination Performance award in MSc Electrical Engineering.
- Cardiff University Vice Chancellor's International Scholarship.
- BSc in Electrical Engineering with the highest accolade Roll-of-Honour.
- University Gold Medal for securing first position in BSc Electrical Engineering.
- Undergraduate University Merit Scholarship.
- National Merit Scholarship.

Professional Memberships

▪ Fellow	Higher Education Academy, United Kingdom
▪ Senior Member	Institute of Electrical & Electronic Engineers, USA
▪ Member	Institution of Engineering & Technology (IET), United Kingdom
▪ Chartered Engineer	Engineering Council, United Kingdom
▪ Professional Engineer	Engineering Council, Pakistan