

International Conference on Microwave, Antennas and Circuits (ICMAC 2025)

Workshop 1: From Algorithms to Silicon: Designing AI Accelerators for Next-Gen Computing

Date: April 16, 2025

Time: 9:00 am to 10:45 am

Venue/Room: Class Room (CR 22), RIMMS



QR Code



Google form link: <https://forms.gle/LZyaEcTApdc8GhyF6>

International Conference on Microwave, Antennas and Circuits (ICMAC 2025)

Workshop 2: Radar System Design using Matlab

Date: April 16, 2025

Time: 9:00 am to 12:30pm

Venue/Room: MDS lab RIMMS

QR Code



Google form link: <https://forms.gle/wtM7CkWqYvLVc7UZ9>



Workshop 3:

In-Band Full Duplex Transceivers: A Future of Integrated Circuit Design

Date: April 16, 2025

Time: 11:15am to 1:00pm

Venue/Room: Class Room (CR) 21, RIMMS

QR code



Google form link: <https://forms.gle/nxev7c89fRUhPoWb7>

International Conference on Microwave, Antennas and Circuits (ICMAC 2025)

Workshop 4: Reconfigurable Intelligent Surfaces

Title of the Talk: Reconfigurable Intelligent Surfaces: Towards Smart Wireless Networks

Date: April 16, 2025

Time: 2pm to 3:45pm

Venue/Room: Seminar Hall, RIMMS

QR code



Google form link; <https://forms.gle/RveRGcSR4Y73fuB18>



International Conference on Microwave, Antennas and Circuits (ICMAC 2025)

Workshop 4: Reconfigurable Intelligent Surfaces

Title of the Talk: Reconfigurable Intelligent Surfaces: Fundamentals, Challenges, and Future Prospects

Date: April 16, 2025

Time: 4:15pm to 5:05pm

Venue/Room: Seminar Hall, RIMMS

QR code



Google form link; <https://forms.gle/RveRGcSR4Y73fuB18>



International Conference on Microwave, Antennas and Circuits (ICMAC 2025)

Quantum Bootcamp

Title of the Talk/Tutorial

RF based quantum computing

Date: April16, 2025

Time: 2:00 pm to 4:30pm

Venue/Room: Class Room (CR 21), **RIMMS**



International Conference on Microwave, Antennas and Circuits (ICMAC 2025)

Quantum Bootcamp

Title of the Talk

Harnessing Quantum Power: From Algorithms to Real-World Applications

Date: April16, 2025

Time: 4:45pm to 5:45pm

Venue/Room: Class Room (CR 21), **RIMMS**

QR Code



Google form link: <https://forms.gle/hUukRgBYMc2fg4pt7>



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Abstract: The rapid advancements in AI have driven the need for specialized AI accelerators that enhance computational efficiency and performance. GPUs, FPGAs, and ASICs have played a crucial role in speeding up AI model execution, optimizing power consumption, and enabling real-time processing. In this talk, we will explore the evolution of AI accelerators, their impact on AI workloads, and how emerging hardware solutions are shaping the next generation of computing. We will also discuss the development process of AI accelerators, from algorithm design to silicon implementation, and their application in modern AI-driven industries.

Bio: Dr. Usman Qayyum is an experienced researcher, a skilled Artificial Intelligence and roboticist, with a proven track record in the research industry with 18+ years of experience. He obtained his MS degree from National University of Science & Technology (NUST) in 2006 as a gold medalist. He holds a Ph.D. with a focus in Robotics and Artificial Intelligence, from the Australian National University in 2014. During the PhD, his research was focused on autonomous aerial vehicles. Later on, he did his post-doctoral on Self-driving cars and was awarded \$15000 for his extraordinary work. He is privileged to demonstrate the first self-driving car to the Prime minister of Singapore (Lee Hsien Loong) in July 2015.

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Workshop 2: Radar System Design using Matlab

Date: April 16, 2025

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Google form link: <https://forms.gle/wtM7CkWqYvLVc7UZ9>

Abstract: Radar systems play a pivotal role in modern sensing and detection applications, from defense to automotive safety. This hands-on workshop is designed for electrical engineering students who have already taken a course on radar systems and are looking to gain practical experience in radar system design and analysis using MATLAB and Simulink.

The session will begin by defining a set of user requirements for a radar system, which will then be translated into key radar parameters such as range, resolution, and detection probability. Participants will learn how to implement these parameters in MATLAB and Simulink, modelling the complete radar system from waveform generation to target detection. The workshop will cover essential aspects of radar signal processing, including pulse compression, Doppler processing, and detection algorithms. By the end of the session, attendees will have hands-on experience in simulating and analysing a functional radar system, gaining valuable insights into real-world radar design challenges.

Bio: Dr. Khan is an Associate Professor at the School of Electrical Engineering and Computer Science (SEECs), National University of Sciences and Technology (NUST). With over 15 years in academia, he has developed curriculum and taught several courses to the undergraduate and graduate students of electrical engineering. He is also an accomplished researcher in the field of RF and Microwave Engineering, with a primary focus on MIMO antenna design, antenna arrays, reconfigurable microwave circuits, and digital radar systems. His recent research explores the use of liquid-based agents for reconfigurable antennas and microwave circuits, as well as digital radar RF front-end development and its applications in medicine and civil domains. He is also a member of Radar Research Lab at NUST where they are undertaking several projects related to the development of radar systems.

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Date: April 16, 2025

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Abstract: The electromagnetic spectrum, which is super expensive resource, is auctioned for billions of dollars. However, its increasing congestion has same challenges as of highway traffic jams. To address this, in-band Full Duplex systems might offer a promising solution in future, resulting in doubling the capacity!

Traditional radio transceivers operate in half-duplex modes, either Time Division Duplex (TDD) or Frequency Division Duplex (FDD). True full-duplex communication, where simultaneous transmission and reception occur at the same frequency, is crucial for mitigating spectrum congestion in beyond 5G systems. The primary obstacle to implementing in-band Full Duplex systems is Self-Interference Cancellation (SIC), the leakage of the transmitted (TX) signal into the receiver (RX). This signal is a billion times (more than 100dB) stronger than the desired signal. Effective cancellation of this strong interfere at same frequency can be achieved through techniques applied across all four domains of transceiver that is antenna, analog, mix signal, and digital.

This workshop will begin by exploring the challenges of spectrum congestion and the potential of In-band Full Duplex systems. We will then embark on a step-by-step tutorial journey, designing novel components tailored for Interference cancellation and future receiver architectures. Specifically, we will delve into the practical implementation of SIC based Low Noise Amplifiers (LNAs) and SIC based Sigma-Delta Analog-to-Digital Converters (ADCs).

Bio: Rashad Ramzan (S'04–M'09–SM'11) received the B.Sc. degree from the UET, Lahore, Pakistan, M.Sc. degree from the Royal Institute of Technology, Stockholm and the Ph.D. degree from Linkoping University, Sweden, in 1994, 2003, and 2009, respectively, all in electronics engineering. He is alumni of the Ohio State University (OSU) and University of Illinois Urbana (UIUC) Champaign, USA. He has been involved in research and development throughout his professional career in industry and academia. He has authored over 100 journals & conference papers, and 15 US patents. He worked in the electronics industry at different research and development positions in Pakistan, USA, Germany, Sweden and South Africa. One of his designed LNA was published in ISSCC 2007. He is a recipient of the two best paper awards and two

chancellor innovation awards. He founded an IC Design (ICD) lab in 2018 and envisaged the 1st MS IC Design Program in Pakistan which graduated more than 80 students in last 4 years. Currently, he is Professor of Elect. Engineering, Director of ICD lab at EE department, and CEO of Pi Invent, a company working in Intellectual Property creation in area of 5G/6G IC design technologies. His research interests are Analog & Mixed Circuit IC Design, RFIC Design, 5G/6G Radio Circuits, VLSI Design, Ultra Low Power Circuits, Energy Tunneling, Bio-Sensors, Wireless Power Transfer Circuits and Sensors. More details can be found at: <https://www.fasticdlab.com/team-page>

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Abstract: The demand for wireless capacity is continuously growing with the advent of the Internet-of-Everything system, connecting millions of people and billions of machines. To date, the fifth generation (5G) wireless networks are being rolled out in the world, providing a new vision to mobile communication. While 5G is still in its commercialization phase, the research on Beyond 5G (B5G) and sixth generation (6G) communication has already started ground work on innovative technologies that support the capacity growth of future networks with lower cost, energy consumption, and hardware complexity. In order to meet the stringent demands on spectral and energy efficiency, B5G and 6G will rely on new and advanced technologies; Reconfigurable Intelligent Surfaces (RIS) being one of them. This workshop starts with fundamentals of wireless systems, limitation of current systems, RIS fundamentals and use cases. We then delve into the research prospects of IRS which are underway at the Information Processing and Transmissions (IPT) Lab at NUST including but not limited to combining IRS with backscatter communications, non-orthogonal multiple access, physical layer security, coordinated multipoint transmission, and STAR-IRSs. The amalgamation of IRS with machine learning more specifically reinforcement learning will also be dealt in detail during the workshop.

Bio: Syed Ali Hassan (Senior Member, IEEE) received the M.S. degree in mathematics and the Ph.D. degree in electrical engineering from Georgia Institute of Technology, Atlanta, USA, and the M.S. degree in electrical engineering from the University of Stuttgart, Germany. His broader area of research is signal processing for communications. He was a Research Associate with Cisco Systems, Inc., San Jose, CA, USA. He is currently a Professor with the School of Electrical Engineering and Computer Science (SEECs), NUST, where he is also the Director of the Information Processing and Transmission Research Group, which focuses on various aspects of theoretical communications. He has (co)authored more than 300 publications in international conferences and journals and has organized several special issues/sessions as editor/chair in



leading journals/conferences. He is also the CTO of Adept Tech Solutions, a US-based start up having its R&D office in Pakistan, providing efficient solutions to engineering businesses.

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Abstract: This talk provides a comprehensive overview of Reconfigurable Intelligent Surfaces (RIS), starting with an introduction to periodic surfaces and their role in controlling electromagnetic waves. We will discuss how periodic structures, such as metasurfaces and frequency-selective surfaces (FSS), form the foundation for RIS design. The talk then covers the implementation of RIS through unit cell design, including tunable meta-atoms, phase-shifting mechanisms, and material choices for dynamic reconfiguration. Alongside above, key challenges in RIS will be discussed, such as accurate electromagnetic modeling, real-time control, hardware limitations, and scalability in large-scale RIS deployments. Finally, we highlight future research directions, including hybrid active-passive RIS, AI-driven adaptive metasurfaces, THz-band RIS for 6G, and RIS-assisted MIMO systems. This session aims to bridge the gap between fundamental concepts and practical deployment, showcasing how RIS can revolutionize wireless communications and smart environments.

Bio: Dr. Muhammad M. Tahseen graduated from Concordia University, Montreal, Canada, currently associated with SEecs-NUST, is a dedicated researcher and an engineer in the field of Radio Frequency (RF) and Microwave (MW) Engineering, specializing in antenna design, and periodic surfaces with their use in designing various RF & MW systems. With a good background knowledge in electromagnetic theory, RF circuit design, and applied electromagnetics, Dr. Muhammad M. Tahseen has contributed to cutting-edge research in Antenna Design Engineering, phased arrays, and microwave components for different wireless communication applications. They have authored several publications in leading IEEE journals and conferences and actively collaborate with academia and industry to develop next-generation RF technologies.

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Quantum Boot camp

Title of the Talk/Tutorial

RF based Quantum Computing

Date: April 16, 2025

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Google form link: <https://forms.gle/hUukRgBYMc2fg4pt7>

Abstract: In this tutorial talk, I will provide a motivation to RF engineers about the fields of quantum information processing, particularly hardware based implementations of quantum computers and quantum control. Some recent advancements in the field will be covered. In the second part of the tutorial, I will review how RF circuits can be harnessed to build a quantum computer, with special emphasis on superconducting quantum interference devices (SQUIDS).

Bio: Dr Muhammad Sabieh Anwar is Professor of Physics, and former Dean at the LUMS Syed Babar Ali School of Science and Engineering, which has about 1500 students, 500 staff members and a hundred PhD holders as Faculty and is the country's leading science and engineering academy. He helped establish the School of Science and Engineering and initiate physics at LUMS and was among the principal founders of the School's experimental facilities and curriculum. Ideas from his physics instructional laboratories, called PhysLab, have been replicated in ten Pakistani universities. He has played an important role in introducing innovative learning tools, mostly revolving around insightful homegrown physics experiments, in Pakistan's universities. His lectures are interspersed with in-class live demonstrations and are widely viewed over the internet. He is co-founder of Qosain Scientific that has invented the PhysLogger and the world's most affordable 3D printer Markhor3D. His latest initiative is the launch of an astronomy laboratory for the developing world, called Astrolab.

Sabieh's research interests encompass spintronics, magnetism and optics. Sabieh has published around a hundred research articles in international journals including Science, the Physical Review series, Optics Express, Journal of the American Chemical Society and Proceedings of the National Academy of Science. His book on tabletop quantum mechanics experiments with single photons was published by the Institute of Physics, UK.

Sabieh is the General Secretary of the Khwarizmi Science Society which is focused on the popularization of science at the grassroots levels. The iconic Lahore Science Mela curated by Sabieh has attracted more than a hundred thousand visitors over a span of eight days in four years. Prior to joining LUMS SSE in 2007, Sabieh was a post-doc in chemistry and materials science at University of

California, Berkeley and a PhD student, as Rhodes Scholar, at the Oxford University. He is the recipient of the TWAS medal in physics for Pakistan in 2008 and the National Innovation Prize in 2015. He also serves as Advisory Board Member of several Pakistani Universities.

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Title of the Talk

Harnessing Quantum Power: From Algorithms to Real-World Applications



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Abstract: Quantum computing is poised to redefine the landscape of computation, offering unprecedented speed and efficiency for solving complex problems. This talk will introduce the fundamental concepts of quantum computing, highlighting its transformative potential. We will explore how quantum algorithms can be executed on real quantum processors via cloud-based platforms such as AWS Braket. A practical discussion on running quantum circuits and leveraging quantum algorithms for optimization and machine learning will be provided. Finally, we will present our research on integrating quantum computing with sensor fusion, specifically in camera and radar-based perception systems. By harnessing quantum principles, we aim to enhance data fusion for AI-driven applications in autonomous systems.

Bio: Dr. Usman Qayyum is an experienced researcher, a skilled Artificial Intelligence and roboticist, with a proven track record in the research industry with 18+ years of experience. He obtained his MS degree from National University of Science & Technology (NUST) in 2006 as a gold medalist. He holds a Ph.D. with a focus in Robotics and Artificial Intelligence, from the Australian National University in 2014. During the PhD, his research was focused on autonomous aerial vehicles. Later on, he did his post doctoral on Self-driving cars and was awarded \$15000 for his extraordinary work. He is privileged to demonstrate the first self-driving car to the Prime minister of Singapore (Lee Hsien Loong) in July 2015.

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