Dr Muhammad Nauman Irshad, MIET

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Education

2022–2025 **Ph.D. in Electrical & Computer Engineering**,
King Mongkut's University of Technology Thonburi, Bangkok, Thailand
Dissertation: *Computationally Efficient Signal Detection Algorithms for Massive MIMO Systems.*
Research Interests: Optimization Algorithms, Mathematical modeling, Wireless & Mobile Communication, Internet of Things (IoT), Massive MIMO, AI, Computer Networks, 5G Networks and Beyond.

2016–2019 **Master of Engineering in Information & Communication Engineering**,
University of Science & Technology Beijing, China,
Dissertation: *Research on the Architecture of 5G Mobile Communication based on SDN*
Subsidiaries: *Digital Communication, Calculation Methods, Internet of Things (IoT), Artificial Intelligence, Mobile Internet, Signal Processing, Information Theory & Network Coding & Chinese Language I-II.*

2011–2015 **Bachelor of Science (Hons.) in Electronics**,
Government College University, Lahore, Pakistan,
Dissertation: *Study of IP based Switching for Home Appliances*
Subsidiaries: *Physics, Calculus & Advance Calculus, Communication Skills, Basic & Digital Electronics, Microprocessor Controller & Programming, Electronics Communication, Signal & System, Control System, Bio-Medical Electronics, Artificial Intelligence, Image Processing, & Computer Applications.*

Work Experience

Nov 2025 – Till date **Postdoctoral Research Fellow**, *National Institute of Telecommunications (Inatel)*, MG, Brazil
Working on the xG Mobile Project at Wireless AI (WAI) Lab with industry collaboration focusing on 5G/6G technology development, with emphasis on resource-aware model optimization for M-MIMO, Reconfigurable Intelligent Surfaces (RIS), fluid antenna systems, and Integrated Sensing and Communications (ISAC).

- Developing low-complexity algorithms for Reconfigurable Intelligent Surfaces (RIS) in massive MIMO deployments
- Researching fluid antenna systems for enhanced spectral efficiency in 6G networks
- Researching AI models for Integrated Sensing and Communications (ISAC) frameworks for next-generation wireless systems
- Reducing computational complexity, latency, memory usage, and energy consumption for edge devices
- Devising computationally efficient signal processing techniques for communication-sensing integration
- Participating in technical discussions and problem-solving sessions within the Wireless AI research group

Jun 2025 – Nov 2025 **Visiting Research Fellow**, *Auckland University of Technology (AUT)*, Auckland, New Zealand
Conducted advanced research in wireless communication systems within the School of Engineering, Computer and Mathematical Sciences, focusing on next-generation networks and industry-academic collaborative research.

- Engaged in collaborative research on Massive MIMO and next-generation wireless protocols with industry stakeholders
- Developed novel algorithms for scalable and energy-efficient IoT communications with industry application focus
- Collaborated with faculty, industry partners, and postgraduate researchers on joint publications
- Contributed to industry-academic partnerships exploring 5G/6G communications deployment challenges

Mar 2022 - April 2023 **Lecturer**, *Lahore Garrison University*, Pakistan

Pursued teaching-focused academic pathway alongside PhD research. Supervised postgraduate students and held responsibilities aimed at enhancing teaching and research mentoring.

- Supervised and mentored final-year student projects in wireless communications and IoT
- Guided postgraduate research students on thesis development and research methodology
- Designed and delivered lectures for computer science and information technology subjects
- Mentored students in technical writing, experimental design, and independent research skills
- Facilitated school-to-university transition through comprehensive Study Skills program

Sep 2021 - Mar 2022 **Lecturer**, *National Textile University, Karachi Campus*, Pakistan

Delivered comprehensive computer science and information technology education while supporting department initiatives.

- Developed and delivered curriculum for undergraduate computer science courses, focusing on practical applications and theoretical foundations
- Implemented innovative teaching methodologies to enhance student engagement and learning outcomes
- Collaborated with faculty to align course materials with industry trends and technological advancements
- Provided academic mentorship to students pursuing careers in respective domains of students

Jan 2020 - Sep 2021 **Lecturer**, *Punjab Group of Colleges*, Pakistan

Taught Computer Science and Physics courses for intermediate/college level students, focusing on both theoretical foundations and practical applications.

- Delivered engaging lectures that transformed complex concepts into accessible learning experiences
- Conducted practical laboratory sessions that reinforced theoretical knowledge through hands-on experimentation
- Implemented innovative teaching methods including visual demonstrations and interactive discussions
- Provided comprehensive exam preparation through targeted practice sessions and personalized feedback
- Mentored students on academic progression and career pathways in science and technology fields

Aug 2015 - Aug 2016 **Lecturer**, *Central Institute of Management Sciences (CIMS)*, Lahore, Pakistan

Provided foundational computer science education for undergraduate students.

- Taught core computer science concepts including programming fundamentals, communication technologies, and electronics
- Designed and graded assignments that reinforced theoretical knowledge with practical applications
- Conducted tutorials and provided additional support for struggling students
- Participated in curriculum development to align course content with industry requirements

Dec 2012 - Jul 2015 **Physics Teacher**, *Al-Hassan Academy*, Lahore, Pakistan

Delivered comprehensive physics education for high school and college-level students.

- Created engaging lesson plans that simplified complex physics concepts for diverse learning abilities
- Developed laboratory experiments demonstrating practical applications of theoretical principles
- Prepared students for college entrance examinations with targeted review sessions
- Advised students on academic pathways leading to Science, Technology, and Engineering careers

Additional Positions

Aug 2017 - Sep 2020 **Assistant IT Engineer & Device Tester**, *CSOFT International Ltd.*, Beijing, China

Balanced part-time technical role with academic studies, specializing in multilingual software testing with focus on Urdu language implementation.

- Conducted comprehensive testing of software applications for linguistic accuracy and cultural appropriateness while maintaining academic commitments
- Developed testing protocols to ensure optimal user experience for Urdu-speaking users
- Collaborated with international development teams to resolve localization issues on a flexible schedule
- Created documentation and user guides for multilingual software implementations

Sep 2021 - Mar 2022 **Science Communication Officer**, *TDF MagnifiScience Centre*, Karachi, Pakistan

Served as a part-time STEM educator and communicator while maintaining primary academic responsibilities.

- Delivered engaging demonstrations and explanations of ICT and Physical Sciences concepts to diverse audiences
- Facilitated interactive STEM experiences designed to spark interest in scientific concepts and careers
- Guided student groups and visitors through exhibits, adapting explanations to various age groups and knowledge levels
- Collaborated with the education team to develop and improve presentation methods for complex scientific principles
- Maintained exhibit functionality and safety while providing an educational and enjoyable visitor experience

Internship Experience

Nov 2015 - Jan 2016 **Trainee Engineer**, *Pakistan Television Corporation (PTV)*, Lahore, Pakistan

Gained hands-on broadcast engineering experience at Pakistan's premier television network.

- Assisted in technical setup and execution of studio recordings and live broadcasts
- Operated professional broadcast equipment including cameras, audio mixers, and transmission systems
- Troubleshot technical issues in real-time during live broadcasting scenarios

Jul 2014 - Aug 2014 **Trainee Engineer**, *Pak Elektron Limited (PEL)*, Lahore, Pakistan

Completed intensive technical training at the Energy Meter Plant (EMP) department.

- Participated in assembly and quality control processes for electronic energy meters
- Learned calibration procedures for precision measurement equipment
- Documented technical specifications and testing results for production batches

Publications

Selected Journal Publications

1. **Irshad, M. N.**, Li. X. J, and R. Silapunt, "Electronically Configured Transmitting and Reflecting Intelligent Surface", *IEEE Wirel. Commun. Lett.*, 2026 (Under-review).
2. **Irshad, M. N.**, I. A. Khoso, and M. Akhtar, "Geometry-Clustered Low-Complexity Detection for Near-Field and RIS-Assisted XL-MIMO", *IEEE Sign. Procc. Lett.*, 2026 (Under-review).
3. **Irshad, M. N.**, "A Low-Complexity Adaptive Interference-Regularized Signal Detector", *Infor. and Soft. Tech.*, 2026 (Under-review).
4. **M. N. Irshad**, M. M. Aslam, and M. Ejaz, "Optimization Framework for Latency-Aware Task Scheduling and Resource Allocation in UAV-Enabled Mobile Edge Computing," *Physic. Commun.*, 2026, (Under Review).
5. **M. N. Irshad**, and M. Akhtar, "A Benchmark Dataset of Simultaneous Pickup-Delivery Instances for Demand-controlled and Emission-aware Routing," *Scient. Data*, 2026, (Under Review).
6. **M. N. Irshad**, M. M. Aslam, M. Akhtar, and R. Silapunt, A Novel Quasi Accelerated Over-Relaxation Method for Efficient Signal Detection," *IEEE Commun. Lett.*, 2025, doi: 10.1109/LCOMM.2025.3604055.
7. **M. N. Irshad**, M. F. I. Buland, "Extended Accelerated Over-Relaxation Algorithm for Low Complexity Massive MIMO Signal Detection", *IET Elect. Lett.*, vol. 61, no. 1, 2025, doi: 10.1049/ell2.70436.
8. **M. N. Irshad**, M. M. Aslam, and R. Silapunt, Low Complexity Optimized AOR Method for Massive MIMO Signal Detection," *IEEE Access*, vol. 13, pp. 51054–51068, 2025, doi: 10.1109/ACCESS.2025.3550272.
9. **M. N. Irshad**, I. A. Khoso, M. M. Aslam, and R. Silapunt, "Optimized Accelerated Over-Relaxation Method for Robust Signal Detection: A Metaheuristic Approach," *Algorithms*, vol. 17, no. 10, p. 463, 2024, doi: 10.3390/a17100463.
10. M. M. Aslam, A. Tufail, H. Gul, **M. N. Irshad**, and A. Namoun, "Artificial intelligence for secure and sustainable industrial control systems - A Survey of challenges and solutions," *Artif. Intell. Rev.*, vol. 58, p. 349, 2025, doi: 10.1007/s10462-025-11320-9.
11. M. M. Aslam, A. Tufail, and **M. N. Irshad**, "Survey of Deep Learning Approaches for Securing Industrial Control Systems: A Comparative Analysis," *Cyber Secur. Appl.*, vol. 3, p. 100096, 2025, doi: 10.1016/j.csa.2025.100096.
12. I. A. Khoso, M. Ali, **M. N. Irshad**, S. Chaudhary, P. Vanichchanunt, and L. Wuttisittikulkij, "Low-Complexity SAOR and Conjugate Gradient Accelerated SAOR Based Signal Detectors for Massive MIMO Systems," *Appl. Syst. Innov.*, vol. 7, no. 6, p. 102, 2024, doi: 10.3390/asi7060102.

Selected Journal Publications (continued)

13. H. B. U. Haq, W. Akram, **M. N. Irshad**, A. Kosar, and M. Abid, "Enhanced Real-Time Facial Expression Recognition Using Deep Learning," *Acadlore Trans. AI Mach. Learn.*, pp. 24–35, 2024, doi: 10.56578/ataiml030103.
14. M. M. Aslam, L. Du, Z. Ahmed, **M. N. Irshad**, and H. Azeem, "A Deep Learning-Based Power Control and Consensus Performance of Spectrum Sharing in the CR Network," *Wirel. Commun. Mob. Comput.*, vol. 2021, p. 7125482, 2021, doi: 10.1155/2021/7125482.
15. M. M. Aslam, **M. N. Irshad**, and H. Azeem, "Cost Effective & Energy Efficient Intelligent Smart Home System Based on IoT," *Int. J. Eng. Technol. Appl. Sci.*, vol. 3, no. 1, pp. 10–20, 2020.
16. I. A. Khoso, X. Dai, **M. N. Irshad**, A. Khan, and X. Wang, "A Low-Complexity Data Detection Algorithm for Massive MIMO Systems," *IEEE Access*, vol. 7, pp. 39341–39351, 2019, doi: 10.1109/ACCESS.2019.2907366.

Conference Publications

1. **Irshad, M. N.**, Ejaz. M., and Raza, A., "IoT Sensor Networks Optimization for Ultra-Low Latency in 6G URLLC Environment", *ICISCT'25*, Karachi, Pakistan, 2025.
2. M. M. Aslam, R. Y. Zakari, W. Shafik, H. Gul, **M. N. Irshad**, A. Tufail, and A. Namoun, "Sustainable and Energy-Efficient Industrial Control System: Comparative Analysis of Swarm and Evolutionary Algorithms," in *Proc. 22nd Int. Conf. Electr. Eng./Electron., Comput., Telecommun. Inf. Technol. (ECTI-CON)*, 2025.
3. Y. Guo, **M. N. Irshad**, M. M. Aslam, A. Qurban, and A. Raza, "IHGWO-Based Optimization of IoT Wireless Sensor Networks," in *Proc. 19th ACM Int. Symp. QoS Secur. Wireless Mobile Netw. (Q2SWinet) of MSWiM'23*, 2023, pp. 97–104, doi: 10.1145/3616391.3622769.
4. **M. N. Irshad**, L. Du, I. A. Khoso, T. B. Javed, and M. M. Aslam, "A Hybrid Solution of SDN Architecture for 5G Mobile Communication to Improve Data Rate Transmission," in *Proc. 28th Wireless Opt. Commun. Conf. (WOCC)*, 2019, pp. 1–5, doi: 10.1109/WOCC.2019.8770664.

Book Chapters

1. M. M. Aslam, A. Tufail, **M. N. Irshad**,S. Ali, and L. Du, "Cyber Security Concerns of IoT for Real-timeApplications: A Review.", *CRC Press*, pp. 1–22, 2025.

Skills & Expertise

Interpersonal Skills

- Communication Skills & Team-Working
- Negotiation, Persuasion and Influencing Skills
- Problem Solving and Decision-Making
- Self-Management, Conflict Resolution and Mediation

Technical Expertise

- **Cloud Computing:** AWS services including EC2, CloudFront, VPC configuration, IAM management
- **DevOps:** Web server deployment, virtual private network (VPN) configuration, cloud infrastructure management
- **Operating Systems:** Linux, Windows OS, Windows Server, Virtual Machines
- **Programming:** Python, C/C++, MATLAB
- **Networking:** Computer & Wireless Networking, Cisco Packet Tracer, GNS3, SDN Floodlight Controller
- **Simulation & Modeling:** NS-2/NS3 network simulation, EWB Multisim circuit design, ISIS-Proteus PCB development
- **IoT & Embedded Systems:** Arduino prototyping, MCUs, Raspberry Pi application development, Wireless sensor network deployment, IoT architecture design
- **Content Creation:** Adobe Photoshop, Logo Designing, Adobe Premier Pro & Sony Movie Studio
- **Productivity:** Microsoft Office Suite, Various System Software Applications
- **Research Tools:** LaTeX/Overleaf, Mendeley and EndNote, Office 365, Jupyter Notebooks, Git/GitHub for collaborative research

Research Expertise

- **Wireless Communications:** Massive MIMO Systems; Reconfigurable Intelligent Surfaces (RIS); Fluid Antenna Systems; Integrated Sensing and Communications (ISAC); 5G/6G Networks; Wireless AI and Machine Learning
- **Signal Processing:** Low-Complexity Detection Algorithms; Channel Estimation; Optimization Techniques; Communication-Sensing Integration
- **Collaborative Research:** Industry-Academic Partnerships; Technology Transfer; Real-World System Implementation; International Research Collaboration

Teaching Expertise

- **University Level:** Information & Communication Technologies; Basic & Digital Electronics; Software Engineering; Artificial Intelligence; Computer Networks; Internet of Things (IoT); Wireless Communications; IT Infrastructure; Research Methodology
- **College Level:** Computer Science; Physics; Mathematics
- **Secondary Level:** Physics; Mathematics; General Science

Certifications

Google Analytics for Beginners, *Google Analytics Academy*

Comprehensive training in website data collection, processing, and configuration within Google Analytics.

Machine Learning with Python, *IBM Developer Skills Network*

In-depth course covering Python-based machine learning algorithms, implementations, and applications in collaboration with Cognativeclass.io.

Responsible Conduct of Research (RCR), *COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI)*

Training on ethical guidelines and best practices for conducting academic and scientific research.

Professional Development

Aug 2022 **Faculty Development Program -X**, *Lahore Garrison University*, Lahore, Pakistan

Intensive professional development program focused on outcome-based learning methodologies.

- Acquired strategies for implementing competency-based education in higher education settings
- Developed skills in curriculum mapping and assessment design for measurable learning outcomes
- Explored innovative pedagogical approaches to enhance student engagement and retention
- Collaborated with faculty peers on developing discipline-specific applications of outcome-based learning

Apr 2016 **Pre-Service Educators Training Program**, *Pak-Turk Academy of Teaching & Learning Excellence (PATLE)*, Lahore, Pakistan

Two-day intensive workshop on contemporary teaching methodologies and educational technology integration.

- Explored innovative teaching techniques focused on student-centered learning
- Gained hands-on experience with technology tools for classroom engagement
- Developed strategies for effective assessment and feedback mechanisms
- Acquired methodologies for adapting teaching approaches to diverse learning styles

May 2015 **Youth Leadership Orientation Workshop and Training**, *Akhuwat Foundation Pakistan*

Three-day intensive workshop developing leadership skills and community engagement strategies.

- Participated in team-building exercises emphasizing collaborative problem-solving
- Developed strategic planning and project management capabilities
- Enhanced interpersonal communication skills through structured activities
- Explored ethical leadership principles and their practical applications

Interests & Co-Curricular Activities

Technical Interests: AI, Wireless communications; Signal processing; IoT development; Embedded systems; Sensors Network; FPVs & Drones

Recreational Pursuits: Mountaineering; Cricket; Badminton; Archery; Photography; Calligraphy; Poetry; Performing arts

Academic & Professional Affiliations

- IET Member, IEEE Member, IEEE Young Professionals, IEEE ComSoc. (Since 2023)
- Member, ACM Student Chapter, GC University Lahore (2013-14)
- Executive Member, Rovers' Club (Scouts), GC University Lahore (2012-2015)
- PEEF Ambassador, Punjab Educational Endowment Fund, GC University Lahore (2011-12)
- Coordinator, Education Society, GC University Lahore (2011-12)
- Member, Media Watch Society, GC University Lahore (2011-12)

Competitions & Academic Events

- Participant, Photography and Poetry Competition, COMSATS Abbottabad (2020)
- Attendee, International Conference on 5G and Emerging LTE Technologies, UET Lahore (2016)
- Participant, Coding Greek (Programming) Competition, All Pakistan Tech & Art Festival 14, GC University Lahore (2014)
- Participant, Calligraphy and Speed Wiring Competitions, NAGS'13, GC University Lahore (2013)
- Participant, Speed Wiring and Other Competitions, All Pakistan Arts, Science & Technology Festival 12, GC University Lahore (2012)
- Participant, Various Electronics Competitions, ELECTROTECH'12, GC University Lahore (2012)

Volunteer Experience & Event Organization

- International Volunteer, Olympic Day, Beijing (2017)
- Volunteer, International Youth Leadership Summit (IYLS), Peking University (2017)
- Member of Organizing Committee, Open Punjab Women Archery Competition, Punjab Stadium Lahore (2015)
- Member of Organizing Committee, 1st All Pakistan Scouts & Volunteers Gala, GC University Lahore (2014)
- Volunteer, Cancer Care Hospital and Research Center Awareness Campaign, Lahore (2013)

Distinctions & Awards

Scholarships, Awards & Research Fundings

- **The Petchra Pra Jom Klao Research Scholarship** (2022): Fully funded doctoral research scholarship, King Mongkut's University of Technology Thonburi, Thailand.
- **China Scholarship Council (CSC) Research Scholarship** (2016): Fully funded master's scholarship, University of Science and Technology Beijing.
- **GC University Financial Aid Award** (2011-2015): Full tuition coverage for undergraduate studies, GC University Lahore, Pakistan.
- **Chief Minister of Punjab Merit Laptop Award** (2012): Recognition for academic excellence.

Competition Achievements

- **All Pakistan Multiomics Photography Competition** (2023): First prize.
- **Inter-departmental Debates and Poetry Competition** (2015): Third position in poetry, GC University Lahore.
- **Urdu News Reporting Competition** (2013): First position, All Pakistan Tech & Art Festival.
- **Speed Wiring Competition** (2012): Second position, SFTRONIX 12, IEEE GC University Lahore Branch.

References

Available on request.