

Dr. Farah Haroon

Principal IIEE

Institute of Industrial Electronics Engineering (IIEE),

Pakistan Council of Scientific and Industrial Research (PCSIR),

Email: farah@iiee.edu.pk

Profile:

I am an educationist with twenty nine years of experience in teaching and research. My aim is to delve knowledge and engineering skills in research and pedagogic activities with current trends and advancement in Wireless Communication and Industrial Automation.

Education:

- PhD (Telecommunication) in 2011 from Asian Institute of Technology (AIT), Thailand.
Dissertation Title: Evaluation of Real Time Performance of Impulse radio Time Hopping Ultra Wide Band (UWB) Field Bus
- M.Engg (Electrical) in 2003 from NED University of Engineering and Technology, Pakistan with 3.8 CGPA.
- B.E (Industrial Electronics) in 1994 from NED University of Engineering and Technology, Pakistan.

Research Interests:

- My principal investigation is mainly focused to the involvement of wireless activities in industrial automation and control systems. It specifically targets the deployment of low data rate IEEE 802.15.4a UWB wireless personal area networks (WPANs) in industrial Field Bus technology which was unexplored. Regardless of the previous efforts, the imperative aspect of this research study is the involvement of realistic dense multipath propagated non line of sight (NLOS) Industrial field channel characteristics in presence of broadband noise and interferences. The specific problem of real time performance was concentrated and an adaption is proposed at both the MAC and PHY layers. Besides timeliness, the reception and error performances of the selected PHY are also addressed and validated over additive white Gaussian noise (AWGN) and NLOS industrial environment employing Correlation and selective Rake (SRake) receivers. Likewise for the eradication of broadband noise and interferences, an adaptive architecture for SRake is proposed which effectively reduces the complexity of the conventional SRake reception.
- Currently my research is focused towards deployment of signal processing and Artificial Intelligence for solving detection, classification and decision making mainly in medical and industrial problems.
- Areas of research also include spectrum sensing using coherent / non coherent techniques over various large-small scale fading environments and Resource Allocation in Wireless Communications. Respective performance analysis and detection probabilities are derived in comparison with the available results.
- Integrated Industrial Automation is of particular area of interest and practical inspiration. Several problems of process industry have been solved in this context.

Work Experience:

- Principal IIEE since January 2020.
- Vice Principal IIEE; March 2018 till Dec 2019
- Chief Engineer in BPS-20 since October 2021
- Principal Engineer in BPS-19 from July 2015 till October 2021
- Chief Instructor in BPS-18 from July 2000 till July 2015
- Senior Instructor in BPS-17 from October 1996 till July 2000

Research and Development Activities:

Project Director of PSDP Project

In reference to PCSIR, HO letter No: 70(12)P&D/PCSIR/2020/2223 dated 05-11-2020, I have been assigned an additional charge of Project Director of a PSDP Project titled as “Up gradation of Machinery, Equipment and Buildings of IIEE and PSTC, Karachi” of worth Rs.125 Million titled as “Upgradation of Machinery, Equipment and Buildings of IIEE and PSTC, Karachi.” The project is funded by Ministry of Science and Technology, Government of Pakistan.

Supervision of Masters and PhD. Student

I am involved in supervision of HEC recognized Masters and PhD. students in Electrical Engineering Bharia University Karachi Campus and PNEC, Karachi. The detail includes

- Member of relevance assessment committee for relevance of faculty and thesis evaluation.
- External examiner in MS Thesis titled as, “Optimal Configuration of Hybrid Renewable Energy System for Remote Areas of Balochistan”.
- Principal Research Supervisor in MS Thesis titled as, “GSM Based SCADA System Using TCP/IP.”
- External Examiner in MS Thesis titled as, “Image Processing based Grain Analyzer for Rice of Pakistan”.
- Committee Member of PhD. Thesis titled as “3-D Image Analysis Techniques for Lung Cancer Detection on Computed Tomography (CT) Scans”.
- Local Evaluator of the PhD. dissertation titled as “Multi Resolution Transform based Feature Extraction techniques for differentiating Glioma Grades using MRI Images” at PNEC, Karachi.

HEC Recognized Research Activities

I am involved in the following HEC recognized research activities,

- **Reviewer** in 2nd International Conference, Interact 2023 held on 15-16th March 2023, Karachi.
- **Session Chair** of Technical session IV, “Machine Learning and IOT” in 7th International Conference, IEEC 2021 held on 25-26th March 2022.
- **Session Chair** of Technical session IV, “Signal Processing and Applications” in 6th International Conference, IEEC 2021 held on 8th April 2021.
- **Member** of Coordination committee of 4th International Electrical Engineering Conference, IEEC 2019.
- **Session Chair** of Technical session V, “CONTROL Systems and Robotics” in 4th International Conference IEEC 2019 held on 25th and 26th January 2019.

- **Member** of organizing committee of 3rd International Electrical Engineering Conference, IEEEC 2018.
- **Reviewer** and **Session Chair** in 3rd International Electrical Engineering Conference, IEEEC 2018.
- **Program Committee Member** of CCode 2017.
- **Reviewer** of HEC recognized Bahria University Journal of Information and Communication Technology, BUJICT 2012, 2013 and 2014, 2015, 2016, 2017.
- **Author and Reviewer** of 4th International Multi-Topic Conference, IMTIC 2012 and IMTIC 2015.
- **Program Committee Member** and Author of IEEE sponsored International Multi Topic Conference, INMIC 2014.
- **Author and Reviewer** of IEEE sponsored International Multi Topic Conference, INMIC 2011, 2015.
Program Committee Member and reviewer of Conference on Information Assurance and Cyber Security (CIACS 2014).
- **Technical Program Committee** in IEEE sponsored 11th International Conference on Frontiers of Information Technology (FIT 2013).
- **Reviewer** of research papers in 2nd National Conference on Information Assurance NCIA 2013.

Continuous Program Development (CPD) Program under Pakistan Engineering Council (PEC)

I am actively engage in CPD program and responsible to carry out a series of lectures and workshops at IIEE PEC CPD calendar.

- In current calendar, workshops have already been organized in category d-8 to buildup basic familiarity with high quality scientific typesetting and document publishing through LaTeX titled as *Scientific document preparation with LaTeX*. The main contents span over Introduction to Latex, Type-setting Text and Mathematics and preparation of IEEE conference and Journal paper templates including Indexing and Bibliography.
- Delivered an invited lecture titled as “Industrial NLOS Environment” in IEEE Technical Seminar.

Research Associate

Worked as Research Associate and conducted lectures to Masters students of Telecommunications Engineering at Asian Institute of Technology Thailand during Jan 2009 to May 2011. Subjects included are Advance Signal Processing, Error Control Coding, Digital Communication Systems, Cellular Mobile, Telecommunication Systems and Satellite Communication.

Pedagogic activities

I am involved in pedagogic and research activities in Institute of Industrial Electronics Engineering (IIEE). IIEE was founded by Swiss Government in collaboration with Pakistan Council of Scientific and Industrial Research (PCSIR) and is affiliated with NED University of Engineering and Technology.

Entrustment as IIEE Academic Incharge:

The following responsibilities were performed to supervise and elevate the academic standard of IIEE

1. Supervision and assurance of the quality and timeliness of academic activity at IIEE.
2. Identification and make recommendations for the resolution of issues related with *Pakistan Engineering Council (PEC) accreditation and NED UET affiliation.*
3. Preparation of academic calendar, course assignment and arrangement of visiting faculty.
4. Compilation of requisitions related with the repair of existing and purchase of new equipment.
5. Promotion of research and development activities at IIEE.
6. Supervision of Placement Bureau and Student Counseling at IIEE.

Chairperson of IIEE Curriculum Revision Committee (CRC):

- Course revision is a continuing process. Being chairperson of CRC, I am responsible for incorporating recommendations of both internal and external IIEE stake holders.
- Any proposal of course revision is subsequently approved by IIEE BOS, BOF-ECE and Academic Council and Syndicate of NED UET.
- Addition of new text books and reference books for latest knowledge delivery is also under taken by CRC.

Teaching Responsibilities in Undergraduate Program:

Throughout my teaching career, I conducted Theory and Practical courses of Circuit Analysis, Electronic Circuit and Systems, Logic Design and Switching Theory, Communication Systems, Computer Communication Networks, Programmable Logic Controllers, Industrial Process Control, Industrial Instrumentation Systems and Digital Signal Processing.

Involvement in IIEE Final Year Projects

Besides conducting theory and practical courses, I am working as an Chairperson Final Year Project under OBE Framework. Likewise on average, three B.E Final year projects are being supervised annually for the last twelve years. It needs continuous guidance and assessment of students throughout the year. These projects are being acknowledged and appreciated both nationally and internationally.

- The supervised projects won under entrepreneur competitions of National Idea Bank II and III in 2023 and 2024 by Dr. Arif Alvi, President of Pakistan and *IEEE Myron Zucker student design in Asia Pacific region 10 and Salam Pakistan student project design awarded by President of Pakistan.*

Workshops on Programmable Logic Control

A series of workshops of (05) weeks were carried out on Siemens S5 and S7 Programmable Logic Controllers for Industrial Professionals, students and academicians of different universities. The course contents span over interfacing, logic and software development using Statement List (STL), Ladder Diagrams (LAD) and Control System Flow Chart (CSF).

Honors and Awards:

- IEEE Industry Application Society 2004 Myron Zucker undergraduate student design award.
- Salam Pakistan student project design 2005 awarded by President of Pakistan.
- Higher Education Commission of Pakistan Overseas Scholarship for PhD in 2007.

Memberships:

- Pakistan Engineering Council (PEC)

IT & Programming Skills:

- Digital typesetting (TEX, LaTeX, JABREF, Win Shell)
- Simulation analysis and Programming in Matlab
- Mathematica for Numerical Computation

Languages:

- Native Urdu
- Fluent in English and broken Thai

Publications:

Journal

- Ammad Ali, Shah Hussain, **Farah Haroon**, Sajid Hussain, and M. Farhan Khan, “Face Recognition with Local Binary Patterns”, Bahria University Journal of Information and Communication Technology (BUJICT) Volume 5, Issue 1, pp 44 – 49, Dec 2012.
- Syed Ali Asad Rizvi, Sham Sunder, **Farah Haroon** and Ashab Mirza, “Virtual Instrumentation for Control Applications”, Communications in Computer and Information Science, 2012, Volume 281, pp. 397 – 402, DOI: 10.1007/978-3-642-28962-0_38, Springer Link Date: April 15, 2012.
- **Farah Haroon** and Kazi M. Ahmed, “An Adaptive IEEE 802.15.4a TH-TDMA UWB Industrial Field Level Network”, Special issue on advances in Wireless Communication, Journal of Communications, Academy Publisher, Vol 5, No 7, pp 571 - 580, July 2010.

Conferences

- Nehal Abdul Rehman, **Farah Haroon**, “Adaptive Gaussian and Double Thresholding for Contour Detection and Character Recognition of 2D Area Using Computer Vision”, 2nd International Conference, Interact 2023 held on 15-16th March 2023, Karachi.
- Habiba Aziz, Mohsin Khan, Sajid Hussain and **Farah Haroon**, “Hand Motion Recognition from EMG using Artificial Neural Network”, 4th International Conference IEEC-2019 held on 25-26th Jan 2019, Karachi.
- Haroon Rasheed, **Farah Haroon** and Nandana Rajatheva, “Pulse Position Modulation based Energy Detection for Smart-Grid Communication” has been accepted in 6th IEEE International Conference on Smart Energy Grid Engineering, SEGE 2018 to be held on August 12-15, 2018 at Oshawa, Canada.
- Haroon Rasheed, **Farah Haroon** and Nandana Rajatheva, “Energy Detection with Diversity Combining Over KG Fading For Cognitive VANET”, accepted in VTC Fall 18-21 Sept 2016, Montreal Canada.
- Junaid Ahmed, Bhavesh Kumar, **Farah Haroon**, and Asif Memon, “Implementation of Industrial Wireless Closed-Loop Control Network Using ZigBee”, 4th International Multi-Topic Conference 2015, Pakistan.

- **Farah Haroon** and Haroon Rasheed, “Modeling and Adaptive Cancellation of Industrial Noise”, 17th IEEE International Multitopic Conference, INMIC 2014, Karachi, Pakistan, pp. 104-109, Dec 2014.
- Syed Ali Asad Rizvi, Sham Sunder, **Farah Haroon** and Ashab Mirza, “Humidity Control with Interactive Web Monitoring: A Cost-Optimal Solution for Printing Industries”, 10th International Conference on Frontiers of Information Technology (FIT), 2012, Islamabad, Pakistan, pp. 209-214, Dec. 2012.
- Haroon Rasheed, **Farah Haroon** and Fumiuyuki Adachi, “On the Energy Detection over Generalized-K (KG) Fading”, IEEE 14th International Multitopic Conference, INMIC 2011, Karachi, Pakistan, pp. 367 – 371, Dec 2011.
- **Farah Haroon**, Haroon Rasheed and Kazi M. Ahmed, “An Adaption of IEEE 802.15.4a in an IR-TH UWB Industrial Field Bus”, IEEE 8th International Conference on Industrial Informatics, INDIN 2010, Osaka, Japan, pp. 531 – 536, July 2010.
- **Farah Haroon**, Haroon Rasheed and Kazi M. Ahmed, “An Adaptive Srake Reception of Biorthogonal IR-TH UWB signals in IEEE 802.154a Industrial NLOS Environment”, IEEE International Conference on Wireless Communications, Networking and Information Security, WCNIS 2010, pp. 237 - 241, Beijing, China, June 2010.
- Haroon Rasheed, **Farah Haroon** and Nandana Rajatheva, “Performance analysis of Rice-Lognormal channel model for spectrum sensing”, IEEE Electronics/ Electrical Computer Telecommunications and Information Technology, ECTI-CON 2010, Chiang Mai, Thailand, pp. 420 - 424, May 2010.
- Haroon Rasheed, Nandana Rajatheva and **Farah Haroon**, “Spectrum sensing with Energy Detection under Shadow-fading Condition”, 5th IEEE International Symposium on Wireless Pervasive Computing, ISWPC 2010 , Modena, Italy, pp. 104 – 109, May 2010.
- **Farah Haroon**, Haroon Rasheed and Kazi M. Ahmed, “A Robust Reception of IEEE 802.15.4a IR-TH UWB in Dense Multipath and Gaussian Noise”, International Conference on Computer Science and Information Technology, ICCSIT 2010, Rome, Italy, pp. 298 - 303, April 2010.