Farhan Mumtaz, Ph.D.

Assistant Research Professor — IEEE Senior Member
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Executive Summary

Highly accomplished Engineering Educator, R&D Manager and Technical Leader with over **18 years of combined experience** spanning the telecommunications industry, high-impact scientific research, and advanced academia. Proven expertise in managing large-scale multi-regional infrastructure projects (Huawei) and cross-functional teams, coupled with specialized technical mastery in Photonics, Fiber-Optic Sensing, Intelligent Smart Sensing, Embedded Systems, and Femtosecond Laser Micro-machining. Demonstrated commitment to grant acquisition, stakeholder management, ABET accreditation standards, student mentorship, leading federally and industrially funded research (DOE, Air Force, Army), and teaching undergraduate electrical engineering courses.

Education

Post-Doctorate — Electrical and Computer Engineering/ Material Science
Missouri University of Science and Technology, Rolla, USA 2021–2022

Ph.D. — Information and Communication Engineering
Wuhan University of Technology, China 2018–2021

M.Phil. — Electronics
Quaid-i-Azam University, Islamabad, Pakistan 2016–2018

M.Sc. — Electronics
Preston University Kohat, Islamabad Campus, Pakistan 2013–2015

MBA — Management Sciences
Sarhad University of Science and IT, Islamabad, Pakistan 2007–2009

B.Sc. — Mathematics & Physics
University of Punjab, Lahore, Pakistan 2004–2006

Academic Appointments

Assistant Research Professor / R&D Expert
Missouri University of Science and Technology (Missouri S&T), USA Jan 2023–Present

- Leading research in fiber-optic sensing for extreme energy environments.
- Mentoring and training 10+ Ph.D. and Master's students in device fabrication, experimental execution, and lab safety protocols.
- Directing full-lifecycle project rollouts, grant management, and customer/stakeholder management for multi-agency research initiatives.
- Fostering strategic industry-academic partnerships to bridge advanced research with commercial application.

Research Scientist / R&D Expert
Missouri University of Science and Technology (Missouri S&T), USA Dec 2021–Dec 2022

- Developed and deployed advanced optical sensing systems for steelmaking and aerospace applications; managed optics lab operations and industry partnerships.
- Coordinated technical execution and client communications for joint R&D deliverables.

Teaching & Research Assistant
Quaid-i-Azam University, Pakistan/ Wuhan University of Technology, China Jan 2016–Nov 2021

- Assisted in curriculum delivery, laboratory supervision, and assessment for undergraduate electronics courses.

Professional Engineering Experience (Industry)

Senior Solution Manager / Project Manager / Plan Control Manager
Huawei Technologies Pvt. Ltd., Pakistan Jan 2007–Oct 2015

- Directed end-to-end project management and strategic planning across 04 major operational regions (North, Center, South, and ICT), ensuring alignment with corporate targets.
- Managed deployment of 40+ telecom infrastructure projects including CDMA, LTE, GPON, and DWDM networks.
- Led integration of baseband units, optical transceivers, and power control systems.
- Served as the primary technical liaison and client relationship manager for corporate telecom clients, driving requirement gathering and stakeholder alignment.
- Utilized SAP and scheduling tools for large-scale infrastructure planning, resource allocation, and risk management.

Teaching Experience & Curriculum Development

Qualified and prepared to teach a comprehensive range of core undergraduate and graduate courses across Computer Engineering, Electrical Engineering, and Cyber-Physical Systems, with strong adherence to ABET accreditation standards.

Core Curricular Competencies & Courses Prepared to Teach

- **Computer Engineering & Embedded Systems:** Digital Logic Design, Introduction to Microprocessors and Microcontrollers, Computer Architecture and Organization, Embedded Systems Design, FPGA-Based System Design, Senior Capstone Design.
- **Artificial Intelligence, Vision & Signal Processing:** Digital Image Processing and Computer Vision, Applied Machine Learning, Real-Time Edge AI and TinyML, Signals and Systems, Digital Signal Processing (DSP), Digital Communications.
- **Circuits, Electronics & Hardware Systems:** Electric Circuits Analysis, Analog and Digital Electronics, Electronic Instrumentation, Mechatronics, Hardware-Software Co-Design.
- **Electromagnetics, Photonics & Sensing:** Electromagnetics, Microwave Engineering, Optical Fiber Sensing and Waveguide Design, Femtosecond Laser Processing, Industrial Transducers.
- **Specialized & Advanced Electives:**
  - *Edge AI and Embedded Intelligence for Cyber-Physical Systems* (Quantized neural networks, int8 inference, MCU and FPGA accelerators).
  - *Hardware Assurance and Resilient Instrumentation* (High-speed DAQ architectures, noise shielding, and fault-tolerant physical-layer systems).
  - *Industrial Internet of Things (IIoT) and Smart Sensor Networks* (Distributed telemetry, protocol integration, and operational technology monitoring).

ABET Alignment, Pedagogical Training & Academic Service

- **ABET Accreditation Standards:** Comprehensive experience designing course syllabi, laboratory modules, and assessment matrices aligned with EAC-ABET and ETAC-ABET accreditation criteria.
- **Outcome-Based Assessment:** Formulation of Course Learning Outcomes (CLOs) mapped directly to measurable Student Learning Outcomes (SLOs 1 through 7).
- **Instructional Recognition:** Recipient of the **SPIE-COMSOL Multiphysics Excellent Trainer Award** (2021).
- **Student Mentorship:** Mentored and trained more than 10 Ph.D. and Master's students, alongside numerous undergraduate researchers, in embedded systems, hardware prototyping, and optical instrumentation.
- **Capstone Design Supervision:** Experienced in guiding multidisciplinary senior engineering design teams through formal project lifecycles, from requirements gathering and PCB design to prototype validation and final defense.

Research Agenda and Funding Support

Primary research focuses on photonic devices and fiber-optic sensing for extreme environments, energy storage, and biomedical applications. Research interests include fiber-optic sensors, particularly fiber Bragg gratings (FBGs); optical sensing, imaging, and spectroscopy; characterization of micro- and nano-scale material structures; intelligent sensing systems and instrumentation for harsh environments; and ultrafast laser machining and processing.

Selected Research Funding

- PI: Intelligent Steel Systems: AI and Sensor-Driven, IGI Missouri S&T, 2026 ($32,000).
- PI: AIST Foundation for a 2026-2027 Digital Technologies for Steel Manufacturing Grant, Cyber-Physical Raman Spectroscopy and Closed-Loop Focus Control for Real-Time Slag Chemistry Analytics in Steelmaking ($30,000).
- PI: Sub-Millimeter High-Temperature Sensing: Bridging the Thermal Blind Spot in Sustainable Energy Manufacturing, College of Engineering and Computing (CEC) SEED Grant, 2026 ($40,000).
- Co-PI: Project #453: "Fiber Optic Temperature Monitoring Sensors for CPI and Refining Processes – Phase 2," Materials Technology Institute (MTI) Request for Proposal, $366,000, 2026–2028 (Proposal submitted).
- PI: TDOT: #8 Fiber-Optic Sensing for Slope Monitoring ($300,000), 2026 (under consideration).
- Co-PI: Wireless FBG Sensor Networks for Extreme Temperature and Structural Monitoring in Steelmaking Operations, PSMRC Industrial grant $450,000, 2026 (under consideration).
- Co-PI: Fiber-Enhanced Raman Off-Gas Diagnostics for Decarbonized Steelmaking, PSMRC Industrial grant $140,000, 2026 (under consideration).
- R&D Lead: Project #408 Materials Technology Institute – Fiber Optic Temperature Monitoring, 2025-26.
- R&D Lead: U.S. Air Force 3D Printed Investment Casting Shell Project, 2025.
- R&D Lead: U.S. Department of Energy (DOE) – Energy Efficiency and Renewable Energy, 2022-26.
- R&D Lead: U.S. Army Research Laboratory, 2023-24.
- Team Member: National Science Foundation of China (multiple awards), 2018-2021.

Honors and Awards

- AIST Foundation award, 2026
- Top 2% Scientist in Optoelectronics & Photonics, 2024–2026 (Stanford University & Elsevier Database).
- IEEE Outstanding Researcher, 2025 – St. Louis Section, MO, USA.
- Panel Reviewer, Steel Research International, WILEY, 2025.
- IEEE Senior Member Award, 2024.
- Featured Articles, AISTech Transactions and Iron & Steel Technology Magazine, 2023–2024.
- SPIE-COMSOL Multiphysics Excellent Trainer Award, Quaid-i-Azam University, 2021.
- IEEE Best Poster Award, ICOCN, 2019.
- MOFCOM Fully Funded PhD Scholarship, 2018.
- Keynote Speaker, Belt and Road Countries Conference (BICC), Beijing, China, 2017.
- Long-Term Service Excellence Award, 2015.
- Excellent Delivery Project Manager, 2015.
- Excellent Team Lead for SAP/FA, 2014.
- Best Emerging Leader, 2011.
- Excellent Plan Control Manager, 2010.

Professional Service and Outreach

- Lead K–12 STEM laboratory tours and outreach initiatives.
- Judge for university research poster competitions and design showcases.
- Host industrial delegations and research facility visits.
- **Reviewer / Peer-Review Service** *IEEE Photonics*, *Optics Letters*, *Optics Express*, *Optical Materials Express*, *Measurement*, *IEEE Sensors Journal*, *IEEE Transactions on Instrumentation and Measurement*, *Springer Nature*, *Applied Physics B*, *MDPI Applied Sciences*, *MDPI Axioms*, *MDPI Energies*, *MDPI Mathematics*, *Optical Fiber Technology*, *MDPI Photonics*, *MDPI Sensors*, *MDPI Electronics*, *International Journal of Optics (Wiley)*, *Journal of Sensors (Wiley)*, *Journal of Modern Optics*, *Journal of Infrared Physics & Technology*, *Journal of Electronic Science and Technology*, *Journal of Optics and Laser Technology*, *Opto-Electronics Review*, and others. *Optics Letters*, and *Journal of Lightwave Technology.*
- Guest Editor for MDPI journals (1) *Coatings* and (2) *Materials.*
- Panel Reviewer for *Steel Research International* (Wiley), 2025.

Professional Memberships

- Senior Member – IEEE (Institute of Electrical and Electronics Engineers)
- Member – Optica (Optical Society of America)
- Member – SPIE (International Society for Optics and Photonics)
- Member – AISTech (Association for Iron & Steel Technology)
- Member – PSMRC (Peaslee Steel Manufacturing Research Center)

Student Mentorship

Ph.D. Students
Ogbole C. Inalegwu (Graduated), Anand K. Nambisan (Graduated), Nahideh S. Salehifar (Graduated), Homayoon S. Dinani (In Progress), Ruimin Jie (In Progress), Robert Abbott (In Progress), Yeshwanth R. Mekala (In Progress), Mobashir Ahmed (In Progress), Hanok Tekle (Graduated), and Rony K. Saha (In Progress).

Master's Students
Rony K. Saha (Graduated), Abhishek P. Hungund (Graduated), Abdul Muqeet (Graduated), and Ghulam Yaseen (Graduated).

Undergraduate Students
Michael Davis (Graduated) – Undergraduate research supervision.

Technical Skills

- **Data Science & AI:** Data analysis, Machine learning, Artificial intelligence, AI-assisted sensor development.
- **Software/Simulation:** MATLAB, RSoft BeamProp, COMSOL, SolidWorks, AutoCAD, Excel, LabVIEW.
- **Instrumentation:** Optical spectrum analyzers, Vector analyzers, Optical power meters, Keysight and DAQ systems, Raman spectroscopy, Grating design, Wafer-level optical testing.
- **Fabrication & Processing:** Femtosecond laser micromachining (Line, Point, Volume), Glass processing for tapering and ball lens fabrication (GPX3400, Thorlabs), Waveguide writing on Sapphire, Silica, SiO2, Salt-based wafers, Bio-compatible sensor fabrication (electrochemical, biodegradable), Photonic crystal fiber simulation (linear/nonlinear), SEM imaging and analysis.
- **Optical Systems & Sensing:** Optical signal path & grating design, Dispersion management, Multimode interference suppression, Mode scramblers, Distributed sensing (strain/temperature, microwave photonics), Structural health monitoring (OZ-Optics BOTDA, R/LUNA ODISI OFDR), Optical interconnects and signal integrity optimization.
- **Project & Productivity Tools:** Microsoft Office, Project management tools.

List of Publications

Journal Papers (2027)

J1. **Farhan Mumtaz***, Ronald J. O'Malley, and Jie Huang, "Multivariate Machine Learning-Assisted In Situ Fiber-Optic Raman Spectroscopy for Real-Time Chemical and Structural Characterization of Molten CaO–SiO_2–Al_2O_3–Na_2O-Based Mold Fluxes at 1,400 °C," *IEEE Transactions on Instrumentation and Measurement*, 2027 (under review).

J2. **Farhan Mumtaz***, Muhammad Subhan Bin Farhan, Jian Zhang, Na Lin, Tao Wang, Zhitai Jia, Ronald J. O'Malley, and Jie Huang, "Neural-Network Demodulation of Quasi-Single-Mode Sapphire Fiber Bragg Gratings in 30 μm Fiber Spliced Directly to Single-Mode Fiber for Temperatures up to 1600 °C," *IEEE Transactions on Instrumentation and Measurement*, 2027 (under review).

J3. **Farhan Mumtaz*** and Jie Huang, "Machine-Learning-Assisted Design and Femtosecond-Laser Fabrication of a D-Shaped Fiber SPR Biosensor with an Au/$Ti_3C_2T_x$ Bilayer for Cancer Cell Detection," *Measurement*, 2027 (under review).

J4. **Farhan Mumtaz***, Muhammad Subhan Bin Farhan, Ronald J. O'Malley, and Jie Huang, "Learning-Based Temperature Measurement With Femtosecond-Written Sapphire Fiber Bragg Grating Ar-

rays up to 1600 °C," *IEEE Transactions on Instrumentation and Measurement*, 2027 (under review).

Journal Papers (2026)

J5. **Farhan Mumtaz***, et al., "Waveguide-assisted single-mode fiber Bragg gratings in a highly multimode coreless fiber via femtosecond laser inscription for extreme temperature quasi distributed thermal sensing," *Journal of Lightwave Technology*, 2026.

J6. **Farhan Mumtaz*** et al., "Distributed Temperature Sensing in the Spray-Cooled Shell of a 150-Ton DC Electric Arc Furnace Using Brillouin Optical Fiber Technology," *IEEE Transactions on Instrumentation and Measurement*, 2026.

J7. K. Dey, R. Kumar, B. Zhang, Narasimman, **Farhan Mumtaz** et al., "Mitigating Hysteresis in Metal-Coated Fibers via Optimized Thermal Treatment for Advanced Distributed High-Temperature Sensing Applications," *IEEE Transactions on Instrumentation and Measurement*, 2026.

J8. R. Zhou, J. Yu, Y. Dai, J. Tang, M. Yang, and **Farhan Mumtaz**, "Multi-parameter optimization and adaptive temperature compensation for FBG strain sensors in wide-temperature-range aerospace applications," *IEEE Sensors Journal*, Jan. 30, 2026.

J9. **Farhan Mumtaz***, K. Zhang, T. Wang, B. Zhang, C. Zhu, L. Bartlett, J. D. Smith, N. Lin, J. Zhang, Z. Jia, R. J. O'Malley, and J. Huang, "High-temperature performance of femtosecond laser inscribed $MgAl_2O_4$ spinel fiber Bragg gratings," *Optics Letters*, vol. 51, pp. 2644–2647, 2026.

J10. R. Jie, C. Zhu, **Farhan Mumtaz***, K. Dey, B. Zhang, and J. Huang, "Sapphire optical fiber Bragg grating sensors based on dispersive microwave-photonic frequency-time domain analysis," *Journal of Lightwave Technology*, Apr. 23, 2026.

J11. **Farhan Mumtaz***, R. Jie, M. S. B. Farhan, K. Zhang, T. Wang, Q. Li, B. Zhang, C. Zhu, J. Zhang, Z. Jia, and J. Huang, "Femtosecond laser inscription of fiber Bragg gratings in lutetium oxide (Lu_2O_3) single-crystal optical fiber for ultra-high-temperature sensing," *Optics Letters*, 2026, doi: 10.1364/OL.604790.

J12. **Farhan Mumtaz***, H. Tekle, T. Sander, J. Insana, M. Leite, D. Brown, Y. Wang, D. Palmer, S. Abraham, J. D. Smith, R. J. O'Malley, and J. Huang, "On-Line Multidepth Thermal Profiling and Level Tracking in a Continuous Caster Tundish Using Distributed Sapphire FBG Sensors," *AIST Transactions*, vol. 23, no. 8, pp. 1026-1–1026-15, 2026. doi: 10.33313/TR/1026.

J13. **Farhan Mumtaz***, M. S. B. Farhan, J. Zhang, N. Lin, T. Wang, Z. Jia, and J. Huang, "High-contrast sapphire fiber Bragg grating sensor via quasi-single-mode excitation for extreme-temperature applications," *IEEE Transactions on Instrumentation and Measurement*, 2026. (Under Review)

J14. **Farhan Mumtaz***, R. J. O'Malley, and J. Huang,"Spherical Ball Lens-Based Sapphire Optical Fiber Passive Sensor for Extreme Temperature Monitoring Based on Blackbody Radiation," *Optics Express*, 2026. (Under Review)

J15. C. Yang, Z. Li, F. Liu, **Farhan Mumtaz**, B. Zhang, A. H. Brozena, T. Li, Y. Hu, Z. Wang, F. Xiang, Q. Zhang, J. Huang, S. Yang, J. Luo, Y. Zhang, and L. Hu, "Rapid Densification of Highly Translucent and Strong Dental Ceramics by Ultrafast High-temperature Sintering," *Matter*, 2026. (Under Review)

J16. B. Zhang, **Farhan Mumtaz**, and J. Huang, "Distributed Optical Fiber Sensing Technologies: Fundamentals, System Architectures and Practical Applications," *Journal of Optics*, 2026. (Submitted / In Review)

Journal Papers (2025)

J17. X. Wang, N. Liu, Z. Huang, J. Yang, G. Chen, B. Li, T. Xie, S. Overa, A. Brozena, T. Li, **Farhan Mumtaz**, B. Zhang, Y. Lin, M. Li, B. Mei, S. Li, J. Huang, J. Huang, F. Jiao, C. Gong, G. Wang, M. Chi, I. Takeuchi, Y. Ju, "Ultrahigh-Temperature, Atmospheric-Pressure Electrified Vapor Deposition for Nanomaterials Synthesis," *Nature Synthesis*, 2025.

J18. Ruimin Jie, Robert Abbott, Ogbole Inalegwu, **Farhan Mumtaz**, et al., "A micro-structured optical fiber negative hydraulic pressure sensor," *Journal of Lightwave Technology*, 2025. (Under review)

J19. Bohong Zhang, Hanok Tekle, Ronald J. O'Malley, Jeffrey D. Smith, **Farhan Mumtaz***, and Jie Huang, "In situ high-temperature Raman spectroscopy for online EAF slag analysis," *Journal of Materials Research and Technology*, Available online: Aug. 19, 2025.

J20. Abhishek Prakash Hungund, Bohong Zhang, Narasimman Subramaniyam, Thomas Spudich, Ryan O'Malley, **Farhan Mumtaz**, et al., "Pendant μ-Droplet Evaporation Fabricates Fiber-Optic MOF Gas Sensor in Seconds," *ACS Sensors*, 2025.

J21. **Farhan Mumtaz***, H. Tekle, B. Zhang, X. Li, S. Abraham, B. Mathis, J. D. Smith, et al., "Distributed Sapphire Fiber Bragg Gratings-Based Thermal Profiling of Submerged Entry Nozzles," *IEEE Transactions on Instrumentation and Measurement*, 2025.

J22. I. Sario, G. A. Lashari, A. A. Memon, **Farhan Mumtaz***, "Design and Numerical Investigation of Surface Plasmon Resonance–Based Refractive Index Sensor," *Plasmonics*, pp. 1-16, 2025.

J23. J. Yang, Q. Dong, C. Zhang, W. Zhang, J. Miscall, A. H. Brozena, J. Chen, N. Liu, et al., "Selective Electrified Polyethylene Upcycling by Pore-Modulated Pyrolysis," *Nature Chemical Engineering*, vol. 2, no. 7, pp. 424-435, 2025.

J24. O. C. Inalegwu, R. K. Saha, Y. R. Mekala, **Farhan Mumtaz**, et al., "Advancing Temperature Monitoring of the Bottom Anode in Direct Current Electric Arc Furnace Operations with Distributed Optical Fiber Sensors," *IEEE Transactions on Instrumentation and Measurement*, 2025.

J25. O. C. Inalegwu, M. Roman, **Farhan Mumtaz**, B. Zhang, A. Nambisan, J. Huang, "Machine Learning-Assisted Optical Fiber Specklegram Sensor for Early and Spatially Distributed Water Leak Detection and Localization," *Optical Engineering*, vol. 64, no. 5, 056103, 2025.

J26. G. A. Lashari, **Farhan Mumtaz***, A. Aziz, M. Ali, "Temperature Measurement with Compact Fabry-Perot Interferometer Employing Polymer-Filled Hollow Core Fiber," *Optik*, vol. 327, 172277, 2025.

J27. **Farhan Mumtaz***, B. Zhang, K. Dey, J. D. Smith, R. J. O'Malley, J. Huang, "Discrimination of Temperature and Strain by Characterizing Two Femtosecond Laser-Written Coincident Sapphire Fiber Bragg Gratings for Harsh Environment Applications," *IEEE Transactions on Instrumentation and Measurement*, vol. 1, 2025.

Journal Papers (2024)

J28. Y. Wang, Y. Dai, **Farhan Mumtaz**, K. Luo, "Advanced techniques in quartz wafer precision processing: Stealth dicing based on filament-induced laser machining," *Optics Laser Technology*, vol. 171, 110474, 2024.

J29. A. Muqeet, M. A. Ashraf, **Farhan Mumtaz***, "Spatially tuned photonic crystal fiber sensor mimics visible and near-infrared regimes for wide-range multi-analyte detection," *Measurement*, vol. 227, 114272, 2024.

J30. **Farhan Mumtaz***, B. Zhang, N. Subramaniyam, M. Roman, P. Holtmann, et al., "Miniature optical fiber Fabry–Perot interferometer based on a Single-Crystal Metal–Organic framework for

the detection and quantification of benzene and ethanol at low concentrations," *ACS Applied Materials & Interfaces*, vol. 16, no. 10, pp. 13071-13081, 2024.

J31. **Farhan Mumtaz***, B. Zhang, J. D. Smith, R. J. O'Malley, R. E. Gerald, J. Huang, "Ultrafast annealing improves SNR and long-term stability of a highly multiplexed line-by-line FBG array inscribed by femtosecond laser in a coreless fiber for extreme applications," *IEEE Transactions on Instrumentation and Measurement*, vol. 73, pp. 1-10, 2024.

J32. B. Zhang, **Farhan Mumtaz**, M. Roman, D. R. Alla, R. E. Gerald II, J. Huang, "Miniaturized fluorescence pH sensor with assembly free ball lens on a tapered multimode optical fiber," *Optics Express*, vol. 32, no. 3, pp. 4228-4241, 2024.

Journal Papers (2023)

J33. D. R. Alla, D. P. Neelakandan, **Farhan Mumtaz**, R. E. Gerald, L. Bartlett, R. J. O'Malley, et al., "Cascaded sapphire fiber Bragg gratings inscribed by femtosecond laser for molten steel studies," *IEEE Transactions on Instrumentation and Measurement*, vol. 73, pp. 1-8, 2023.

J34. **Farhan Mumtaz***, H. Tekle, B. Zhang, J. D. Smith, R. J. O'Malley, R. E. Gerald, J. Huang, "Boosting SNR of cascaded FBGs in a sapphire fiber through a rapid heat treatment," *Optics Letters*, vol. 48, no. 21, pp. 5703-5706, 2023.

J35. Y. Wang, Y. Dai, **Farhan Mumtaz**, Y. Yang, K. Luo, "A combined tri-dimensional fiber Bragg grating accelerometer for multi-directional measurements," *Optics & Fiber Technology*, vol. 79, 103360, 2023.

J36. **Farhan Mumtaz***, B. Zhang, R. J. O'Malley, J. Huang, "Large-scale cascading of first-order FBG array in a highly multimode coreless fiber using femtosecond laser for distributed thermal sensing," *Optics Express*, vol. 31, no. 18, pp. 29639-29653, 2023.

J37. **Farhan Mumtaz***, H. Tekle, B. Zhang, J. D. Smith, R. J. O'Malley, J. Huang, "Highly cascaded first-order sapphire optical fiber Bragg gratings fabricated by a femtosecond laser," *Optics Letters*, vol. 48, no. 16, pp. 4380-4383, 2023.

J38. **Farhan Mumtaz***, "Detection of critical cancer cells in human organs using dual demodulation photonic crystal fiber: numerical study," *Results in Optics*, vol. 12, 100493, 2023.

J39. G. A. Lashari, **Farhan Mumtaz***, Z. Ai, Y. Dai, "Recent advancements and future challenges in hybrid optical fiber interferometers," *Optik*, vol. 282, 170860, 2023.

J40. Y. Wang, **Farhan Mumtaz***, Y. Dai*, "Hydrogen gas sensor based on seven-core fiber interference and Pt-WO3 film," *Materials Letters*, vol. 341, 134245, 2023.

J41. Y. Wang, **Farhan Mumtaz**, Y. Dai, "Micromachining of SiO_2 single crystal wafer using femtosecond laser," *Journal of Laser Applications*, vol. 35, no. 2, 2023.

J42. N. M. Anjum, **Farhan Mumtaz***, M. A. Ashraf, "Design and analysis of gold-nanowires based multi-channel SPR sensor," *Results in Optics*, vol. 11, 100397, 2023.

J43. **Farhan Mumtaz***, M. Roman, B. Zhang, J. Huang, "Assembly-free ultra-sensitive miniaturized strain sensor based on an asymmetric optical fiber taper," *Measurement*, vol. 211, 112655, 2023.

J44. **Farhan Mumtaz***, B. Zhang, M. Roman, L. G. Abbas, M. A. Ashraf, Y. Dai, "Computational study: Windmill-shaped multi-channel SPR sensor for simultaneous detection of multi-analyte," *Measurement*, vol. 207, 112386, 2023.

J45. **Farhan Mumtaz***, D. R. Alla, M. Roman, B. Zhang, J. D. Smith, R. E. Gerald, et al., "Thermally robust and highly stable method for splicing silica glass fiber to crystalline sapphire fiber," *Applied Optics*, vol. 62, no. 5, pp. 1392-1398, 2023.

J46. Y. Wang, Y. Wang, Y. Dai, **Farhan Mumtaz**, "Ultrasonic nitrogen jet-assisted femtosecond laser processing of quartz chips," *Optical Materials Express*, vol. 13, no. 2, pp. 348-356, 2023.

Journal Papers (2022)

J47. **Farhan Mumtaz***, G. Yaseen, M. Roman, L. G. Abbas, M. A. Ashraf, M. A. Fiaz, Y. Dai, "Numerical analysis of the highly non-linear and ultra-sensitive modified core of a photonic crystal fiber sensor for detection of liquid analytes," *Journal of the Optical Society of America B*, vol. 40, no. 1, pp. 142-150, 2022.

J48. **Farhan Mumtaz***, M. Roman, B. Zhang, L. G. Abbas, Y. Dai, M. A. Ashraf, M. A. Fiaz, et al., "MXene ($Ti_3C_2T_x$) coated highly-sensitive D-shaped photonic crystal fiber based SPR-biosensor," *Photonics and Nanostructures – Fundamentals and Applications*, vol. 52, 101090, 2022.

J49. G. A. Lashari, **Farhan Mumtaz***, S. Ahmed, "Strain sensing with parallel air-cavity Fabry-Perot interferometers based on Vernier Effect," *Optics & Fiber Technology*, vol. 74, 103117, 2022.

J50. M. Roman, H. Tekle, D. R. Alla, **Farhan Mumtaz**, J. D. Smith, L. Bartlett, R. J. O'Malley, et al., "Temperature monitoring in the refractory lining of a continuous casting tundish using distributed optical fiber sensors," *IEEE Transactions on Instrumentation and Measurement*, vol. 72, pp. 1-11, 2022.

J51. **Farhan Mumtaz***, M. Roman, B. Zhang, L. G. Abbas, M. A. Ashraf, Y. Dai, J. Huang, "Highly sensitive strain sensor by utilizing a tunable air reflector and the Vernier effect," *Sensors*, vol. 22, no. 19, 7557, 2022.

J52. **Farhan Mumtaz***, M. Roman, B. Zhang, L. G. Abbas, M. A. Ashraf, M. A. Fiaz, Y. Dai, et al., "A simple optical fiber SPR sensor with ultra-high sensitivity for dual-parameter measurement," *IEEE Photonics Journal*, vol. 14, no. 5, pp. 1-7, 2022.

J53. L. G. Abbas, **Farhan Mumtaz***, R. Parveen, Y. Dai, M. A. Ashraf, "An efficacious hybrid interferometer based on a Vernier-like effect for dual parameter sensing," *Optik*, vol. 264, 169422, 2022.

J54. L. G. Abbas, **Farhan Mumtaz**, Y. Dai, R. Parveen, M. A. Ashraf, "Vernier effect based temperature sensor revealed ultra-sensitivity with high-detection resolution," *Progress In Electromagnetics Research C*, vol. 118, 2022.

Journal Papers (2021)

J55. L. G. Abbas, Z. Ai, **Farhan Mumtaz**, A. Muhammad, Y. Dai, R. Parveen, "Temperature and strain sensing with hybrid interferometer," *IEEE Sensors Journal*, vol. 21, no. 23, pp. 26785-26792, 2021.

J56. **Farhan Mumtaz***, H. Lin, Y. Dai, W. Hu, M. A. Ashraf, L. Ghulam Abbas, S. Cheng, et al., "Simultaneous measurement of temperature and strain using multi-core fiber within-line cascaded symmetrical ellipsoidal fiber balls-based Mach-Zehnder interferometer structure," *Progress In Electromagnetics Research C*, vol. 112, pp. 21-34, 2021.

J57. Y. Jie, L. A. Leonidas, **Farhan Mumtaz**, M. Ali, "Ship detection and tracking in inland waterways using improved YOLOv3 and Deep SORT," *Symmetry*, vol. 13, no. 2, p. 308, 2021.

J58. **Farhan Mumtaz***, Y. Dai, H. Wenbin, L. G. Abbas, R. Parveen, M. A. Ashraf, "A weakly coupled multi-core fibre-based Michelson interferometer composed of an in-fibre coupler," *Opto-Electronics Review*, pp. 117-125, 2021.

J59. L. G. Abbas, **Farhan Mumtaz**, Y. Dai, A. Zhou, W. Hu, M. A. Ashraf, "Highly sensitive polymer based Fabry-Perot interferometer for temperature sensing," *Progress In Electromagnetics Research Letters*, vol. 97, pp. 87-94, 2021.

J60. **Farhan Mumtaz***, Y. Dai, M. A. Ashraf, W. Hu, "A star-wheel design of single crystal sapphire optical fiber promoting single mode operation in the infrared regime," *Progress In Electromagnetics Research C*, vol. 107, pp. 219-231, 2021.

Journal Papers (2020)

J61. **Farhan Mumtaz***, Y. Dai, M. A. Ashraf, "Inter-cross de-modulated refractive index and temperature sensor by an etched multi-core fiber of a MZI structure," *Journal of Lightwave Technology*, vol. 38, no. 24, pp. 6948-6953, 2020.

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C19. B. Zhang, **Farhan Mumtaz***, M. Roman, D. R. Alla, R. E. Gerald, J. Huang, "Development of a fluorescent-based miniaturized fiber optic pH sensor," *Optical Waveguide and Laser Sensors II*, vol. 12532, 125320X, 2023.

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C23. H. Lin, Y. Xu, **Farhan Mumtaz***, Y. Dai*, A. Zhou, "Cascaded Fabry–Pérot interferometers with Vernier effect for gas pressure measurement," in *Proc. 2019 18th Int. Conf. Optical Commun. Networks*, pp. 1-4, 2019.

Patents

P1. Abhishek Prakash Hungund, Ryan O'Malley, **Farhan Mumtaz** et al., "Integrated System for Rapid Fabrication, Calibration, and Testing of Optical Fiber Metal-Organic Framework Sensors in a Controlled Gas Microenvironment," *U.S. Provisional Patent Application.*

P2. Jie Huang, **Farhan Mumtaz***, and Ronald O'Malley, "Multi-order Line-by-Line and Point-by-Point Sapphire Optical Fiber Bragg Gratings Using Femtosecond Laser Techniques," *U.S. Provisional Patent Application.*

Invited Presentations & Seminars

1. *EuroTAC 2026 Meeting: Fiber Optic Temperature Monitoring Sensors for CPI & Refining Processes*, France, Paris, 2026 (Invited)
2. *SPIE Proceedings: Optical Waveguide and Laser Sensors III*, 2024 (Invited)
3. *Maryville University – Fiber Optic Sensors and Applications*, 2023 (Invited)
4. *IEEE, Optical Communications and Networks*, Huangshan, China, 2019 (Invited)

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