Zubair Khalid

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Summary and Research Interests

I am a *mathematically inspired, engineering-trained, and computationally motivated* researcher with expertise in **artificial intelligence, machine learning, systems engineering, technology policy, computer vision, signal processing, and optimization.** Combining my passion for engineering with my expertise in research and teaching, I am dedicated to advancing knowledge, disseminating knowledge, shaping the next generation of engineers and scientists, and developing innovative solutions.

My highly interdisciplinary research draws on mathematical, computational, and engineering principles to push the boundaries of understanding and develop innovative solutions, including:

- Design and development of algorithms and systems for AI (machine/deep learning), data analysis, optimization, machine vision and information processing
- Development of data-driven methods and policies for climate modelling and urban development
- Technology development for internet of things, intelligent transportation, Industry 4.0, digital transformation of industries and machine vision
- Spherical signal processing applications in Acoustics, Medical Imaging, Cosmology

Expertise

Research & Development Focus: Machine Learning, Deep Learning, Probabilistic AI, Information Extraction, Development of Algorithms, Machine Vision, Advanced Signal Processing, Information Theory

Application Areas: Climate Modelling, Education, Geophysics, Sustainable Urban Development, Industry 4.0, IIoT, Acoustics, Natural Language Processing, Speech Processing, Astrophysics, Cosmology

Education

Australian National University (ANU), Canberra Australia 2013
Ph.D. Engineering
Thesis Topic: Spatio-spectral Analysis on the Unit Sphere

University of Engineering and Technology, Lahore, Pakistan 2008
B. Sc. (Hons.) Electrical Engineering
Rank: 1/300 in Electrical Engineering (Awarded 5 Gold medals)

Experience

Maincode, Australia Jul. 2025 - Present
AI Resident

Lahore University of Management Sciences, Lahore, Pakistan
Associate Professor (Tenured) Dec. 2021 – Present
Assistant Professor Jun. 2015 – Nov. 2021

King Abdullah University of Science and Technology (KAUST) Aug. 2023 – Aug. 2024
Visiting Professor

Australian National University (ANU), Canberra Australia Apr. 2013 – Feb. 2015
Research Fellow May 2016 – Aug-2016

Tetra Pak
Project Engineer Jun. 2008 – Feb. 2010

Highlights

- Recipient of 2024 Gordon-Bell Award (regarded as a Nobel of High-Performance Computing)
- 15 Years of Research & Development Experience in the areas of Machine Learning, Data Analysis, Signal Processing and Systems Engineering
- Active R&D collaborations with leading industries
- 470+ million PKR (~2.1 million USD) R&D Funding since 2015
- Vice Chancellor's Teaching Excellence Award, 2021
- 85 Publications -- 31 Journals and 54 top-ranked conference proceedings
- Associate Editor, IEEE Signal Processing Letters and Senior Member, IEEE
- Research supervision of 9 Ph.D. students (6 graduated)
- Research collaboration with researchers from UCL, ANU, KAUST, NTNU, Sapienza, and EPFL

Grants and Projects (Selected)

- Project: **Recasting best practices of European universities during pandemic for Improving online education in Pakistan HEIs (RAPID)**
  - Amount: *720,000 Euros*
  - Funding Source: EU Erasmus+CBHE 2022

- Project: **Development of Machine Vision Systems**
  - Amount: *6,000,000 PKR*
  - Funding Source: Tetra Pak Arabia, 2023

- Project: **Managing Mobility using Technology and Data Driven Travel Demand Management**
  - Amount: *1,000,000 PKR*
  - Funding Source: Faculty Initiatives Fund, LUMS, 2023

- Project: **Illuminating the Eyes of Industry 4.0: Design and Development of Robust Algorithms, Real-time Systems and Industrial Grade Applications for Machine Vision**
  - Amount: *10,500,000 PKR*
  - Funding Source: HEC National Research Program for Universities Grant 2021

- Project: **Creating Technological Foundations of Data-Driven Policy Making for Sustainable Urban Development**
  - Amount: *210,200,000 PKR*
  - Funding Source: HEC Grand Challenge Fund 2020

- Project: **Catalysing Industry 4.0: Development of Framework and IIoT and Machine Vision Test-beds for Providing Automation Roadmap to the Industries**
  - Amount: *10,300,000 PKR*
  - Funding Source: National Centre for Robotics and Automation (NCRA)

- Project: **Machine Vision Based Surface Quality Inspection System**
  - Amount: *5,300,000 PKR*
  - Funding Source: Bulleh Shah Packaging, 2021

- Project: **Development of an Intelligent System for Active Traffic Management and Efficient Law Enforcement on National Highways and Motorways**
  - Amount: *13,000,000 PKR*
  - Funding Source: HEC Technology Development Fund, 2018

- Project: **Development of Real-Time Machine Vision Based Trim Width Measurement System**
  - Amount: *3,000,000 PKR*
  - Funding Source: Tetra Pak Arabia, 2018

- Project: **Development of Applications for Logistic Optimization and Traceability of Quality Parameters**
  - Amount: *2,840,000 PKR*
  - Funding Source: HEC Technology Development Fund, 2017

- Project: **LUMS Seed Grant Award**
  - Amount: *350,000 PKR*
  - Funding Source: Centre of Water Informatics and Technology, 2017

- Project: **Development of Anisotropic, Fast, Robust and Sparse Spherical Signal Processing Methods with Application to Hydrology and Diffusion Tensor Imaging**
  - Amount: *1,990,000 PKR*
  - Funding Source: HEC National Research Program for Universities Grant 2016

Teaching

The teaching materials for my courses are available to the public here: http://zubairkhalid.org/.

- Spring 2025, Machine Learning (Graduate course)
- Fall 2024, Mathematics for AI (Graduate course)
- Fall 2024, Circuits 1
- Fall 2024, Engineering Design and Measurement Lab
- Spring 2024, Probabilistic Machine Learning (KAUST)
- Fall 2023, Spherical Signal Processing (KAUST)
- Spring 2023, Machine Learning (Graduate course)
- Fall 2022, Circuits 1
- Fall 2022, Mathematical Foundations for Machine Learning and Data Science
- Spring 2022, Machine Learning (Graduate course)
- Fall 2021, Circuits 1
- Fall 2021, Mathematical Foundations for Machine Learning and Data Science
- Spring 2021, Machine Learning (Graduate course)
- Fall 2020, Circuits 1
- Summer 2020, Mathematical Foundations for Machine Learning and Data Science
- Spring 2020, Convex Optimization (Graduate course)
- Fall 2019, Circuits 1
- Spring 2019, Signals and Systems
- Fall 2018, Circuits
- Spring 2018, Feedback Control Systems
- Fall 2017, Circuits 1
- Spring 2017, Feedback Control Systems
- Spring 2017, Convex Optimization (Graduate course)
- Fall 2016, Signals and Systems
- Spring 2016, Feedback Control Systems
- Spring 2016, Convex Optimization (Graduate course)
- Fall 2015, Signals and Systems
- Spring 2015, Signals and Systems

@Australian National University (ANU)

- Semester 2, 2014, 2013 Signal Processing
- Semester 1, 2014, 2013 Probability and Stochastic Processes in Engineering (Graduate course)

Supervision Experience (Research Students)

Ph.D. Students:

- **Hajra Javed**, Sep. 2023 – Present
  - Impact of Industry 4.0 on Environmental Sustainability

- **Asfra Rizwan**, Sep. 2023 – Present
  - Sustainable Urban Green Spaces

- **Muhammad Salaar Arif Khan**, Sep. 2020 – Present
  - Artificial Intelligence on the Sphere

- **Dr. Adeem Aslam**, Jul. 2016 - Jun. 2021
  - Topic: Optimal Filtering, Localized Analysis and Multiscale Representations on the Sphere
  - Research output: 7 Journal papers, 3 Conference papers

- **Dr. Atiqa Kayani**, Jul. 2018 - Jul. 2021
  - Topic: Spatial Correlation in Massive MIMO Systems
  - Co-supervision with Ijaz Haider Naqvi

- **Dr. Wajeeha Nafees**, Jan. 2016 - Jun. 2020
  - Topic: Development of Novel Signal Processing Methods for Signal Analysis on Spherical Manifolds
  - Research output: 4 Conference papers, 1 journal paper

- **Dr. Usama Elahi**, Nov. 2015 - May. 2019
  - Topic: Optimal Dimensionality Sampling for Spin Functions on Sphere
  - Co-supervision with Prof. Rodney A. Kennedy
  - Research output: 1 Journal papers, 6 Conference papers

- **Dr. Alice P. Bates**, Feb. 2014 - Oct. 2016
  - Topic: Anisotropic spherical signal processing with applications in medical imaging
  - Co-supervision with Prof. Rodney A. Kennedy
  - Research output: 4 Journal papers, 6 Conference papers

- **Dr. Yibeltal F. Alem**, Apr. 2013 - Jun. 2015
  - Topic: Compressive sampling on the sphere
  - Co-supervision with Prof. Rodney A. Kennedy

- Research output: 2 Journal articles and 2 conference papers

MS Thesis Students:

- Ata Ullah Butt, 2023 – Present
  - Topic: 3D Generative AI using Spherical Harmonics

- Osama Ahmad, 2023 – 2024
  - Topic: Dynamic Decoupling of Spatio-temporal Data in Graph Networks for Traffic Forecasting and Beyond

- Syed Meharullah, 2023 – 2024
  - Topic: Determining Spatiotemporal Traffic Congestion Hotspots Using Road Network Data Information and Vehicle GPS Trajectories

- Maha Awan, 2021 – 2023
  - Topic: Customization of SpeechBrain Model for South Asian English Accent for Improvement in Automatic Speech Recognition

- Anam Rasul (MS Electrical Engineering), 2019 – 2021
  - Topic: Using sensor fusion for anomaly detection

- Muhammad Osama Tarar (MS Electrical Engineering), 2017 - 2019
  - Topic: Spherical Convolutional Neural Networks Functions
  - Research output: 1 conference papers (EUSIPCO 2020)

- Safa Ashraf (MS Electrical Engineering), 2017 – 2019
  - Topic: Use of MODIS Data for the Localization of Air Pollution Sources Functions

- Asad Ali (MS Electrical Engineering), 2017 – 2019
  - Topic: Optimal Adaptive Placement of Drones for Power Minimization in a Dynamic User Environment

- Naima Munir (MS Electrical Engineering), 2016 – 2017
  - Topic: Reconstruction of Sparse Signals on the Sphere Using Overcomplete Dictionary of Slepian Functions

BE R&D Students:

- Sameul Stefopolous (B. Eng. R&D student), Semester 1, 2014 - Semester 2, 2014
  - Topic: Optimal sampling on the rotation group

- Yundong Zhang (B. Eng. R&D student) - Semester 1, 2015
  - Topic: Fast conjugate gradient extrapolation on the sphere

Collaborations:

Industries and State Institutions:

- Tetra Pak, Bulleh Shah Packages, Jazz, LWMC, 1122 Emergency Response, National Transport and Research Centre (NTRC), National Highway and Motorway Police (NHMP), M&P Logistics.

Academics

- Dr. Jason D. McEwen, Professor at Mullard Space Science Laboratory, UCL, UK
- Dr. Frederik J. Simons, Professor at Department of Geosciences, Princeton University
- Dr. Yves Wiaux, Professor, Heriot-Watt University, Edinburgh
- Dr. Salman Durrani, Professor, Australian National University, Australia
- Dr. Marc G. Genton, Distinguished Professor of Statistics, King Abdullah University of Science and Technology (KAUST), Saudi Arabia

Talks or Presentations (Selected)

- The International Conference for High Performance Computing, Networking, Storage, and Analysis, Atlanta, GA, 2024
  - Boosting Earth System Model Outputs And Saving PetaBytes in Their Storage Using Exascale Climate Emulators
- Statistics Workshop, King Abdullah University of Science and Technology, 2023
  - Spatially Localized Analysis on the Sphere using Slepian Functions
- Natural Capital Project, Stanford University, 2023
  - AI-driven and Evidence-based Decision Making for Sustainable Urban Development: Feature Selection on Sentinel-2 Multi-Spectral Imagery for Efficient Tree Cover Estimation
- 2023 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2023), Pasadena, California.
  - Improved Flood Mapping for Efficient Policy Design by Fusion of Sentinel-1, Sentinel-2 and Landsat-9 Imagery to Identify Population and Infrastructure Exposed to Floods
- Centre for Biomedical Imaging, EPFL Lausanne, 2023
  - Optimal Dimensionality Sampling and Spatially Localized Analysis on the Sphere for Diffusion MRI Applications
- IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Rhodes Island, 2023
  - Estimation of Ground Water Storage Variations in Indus River Basin using GRACE Data
- COMSTECH Webinar, 2022
  - Machine Learning and Data-driven Policy Making for Sustainable Urban Development
- IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Singapore, 2022
  - Estimation of Ground Water Storage Variations in Indus River Basin using GRACE Data
- IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Toronto, Canada, 2021
  - Estimation of Ground Water Storage Variations in Indus River Basin using GRACE Data
- IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Barcelona, Spain, 2020
  - Optimal Window Design For Joint Spatial-Spectral Domain Filtering OfSignals On The Sphere
- IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Brighton, UK, 2019

  - Sampling Schemes for Accurate Reconstruction and Computation of Performance Parameters of Antenna Radiation
  - An Antipodally Symmetric Optimal Dimensionality Sampling on the Sphere
  - Accurate Reconstruction of Finite Rate of Innovation Signals on the Sphere
  - Construction of Overcomplete Multiscale Dictionary of Slepian Functions on the Sphere
- Oct. 2018 World Space Week Event 2018
  - Cosmic Microwave Background: Looking Back at the Beginning of Time
- Apr. 2018, Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Calgary, Canada
  - An improved iterative algorithm for band-limited signal extrapolation on the sphere
  - Spatially-limited sampling of band-limited signals on the sphere
  - Efficient sampling on healpix grid
- Mar. 2017, Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), New Orleans, USA
  - Robust Reconstruction of Spherical Signals with Finite Rate of Innovation
  - Improving the Spatial Dimensionality of Gauss-Legendre and Equiangular Sampling Schemes on the Sphere (Poster presentation)
- Workshop on Statistical Signal Processing (SSP), Gold Coast, Australia, 2014
  - Minimum Mean Square Error Equalization on the 2-Sphere
  - Adaptive Multi-Resolution Windowing Technique for Localized Spatio-Spectral Analysis
- Apr. 2014, Australian National University
  - An Optimal-Dimensionality Sampling Scheme on the Sphere for Fast Spherical Harmonic Transform

Publications (Google Scholar Link)

Journals/Transactions

[1] Z. Khalid, S. Durrani, P. Sadeghi, and R. A. Kennedy, 'Spatio-spectral analysis on the sphere using spatially localized spherical harmonics transform', IEEE transactions on signal processing, vol. 60, no. 3, pp. 1487–1492, 2011.

[2] Z. Khalid, R. A. Kennedy, S. Durrani, P. Sadeghi, Y. Wiaux, and J. D. McEwen, 'Fast directional spatially localized spherical harmonic transform', IEEE transactions on signal processing, vol. 61, no. 9, pp. 2192–2203, 2013.

[3] Z. Khalid and S. Durrani, 'Distance distributions in regular polygons', IEEE Transactions on Vehicular Technology, vol. 62, no. 5, pp. 2363–2368, 2013.

[4] P. Sadeghi, R. A. Kennedy, and Z. Khalid, 'Commutative anisotropic convolution on the 2-sphere', IEEE transactions on signal processing, vol. 60, no. 12, pp. 6697–6703, 2012.

[5] Z. Khalid, P. Sadeghi, R. A. Kennedy, and S. Durrani, 'Spatially varying spectral filtering of signals on the unit sphere', IEEE transactions on signal processing, vol. 61, no. 3, pp. 530–544, 2012.

[6] Z. Khalid, R. A. Kennedy, and J. D. McEwen, 'An optimal-dimensionality sampling scheme on the sphere with fast spherical harmonic transforms', IEEE Transactions on Signal Processing, vol. 62, no. 17, pp. 4597–4610, 2014.

[7] Z. Khalid, R. A. Kennedy, and J. D. McEwen, 'Slepian spatial-spectral concentration on the ball', Applied and Computational Harmonic Analysis, vol. 40, no. 3, pp. 470–504, 2016.

[8] Z. Khalid, S. Durrani, and J. Guo, 'A tractable framework for exact probability of node isolation and minimum node degree distribution in finite multihop networks', IEEE transactions on vehicular technology, vol. 63, no. 6, pp. 2836–2847, 2013.

[9] Y. F. Alem, Z. Khalid, and R. A. Kennedy, 'Spherical Harmonic Expansion of Fisher--Bingham Distribution and 3-D Spatial Fading Correlation for Multiple-Antenna Systems', IEEE Transactions on Vehicular Technology, vol. 65, no. 7, pp. 5695–5700, 2015.

[10] A. P. Bates, Z. Khalid, and R. A. Kennedy, 'Novel sampling scheme on the sphere for head-related transfer function measurements', IEEE/ACM Transactions on Audio, Speech, and Language Processing, vol. 23, no. 6, pp. 1068–1081, 2015.

[11] Z. Khalid, S. Durrani, R. A. Kennedy, Y. Wiaux, and J. D. McEwen, 'Gauss-Legendre sampling on the rotation group', IEEE Signal Processing Letters, vol. 23, no. 2, pp. 207–211, 2015.

[12] A. P. Bates, Z. Khalid, and R. A. Kennedy, 'An optimal dimensionality sampling scheme on the sphere with accurate and efficient spherical harmonic transform for diffusion MRI', IEEE Signal Processing Letters, vol. 23, no. 1, pp. 15–19, 2015.

[13] Y. F. Alem, Z. Khalid, and R. A. Kennedy, '3D spatial fading correlation for uniform angle of arrival distribution', IEEE Communications Letters, vol. 19, no. 6, pp. 1073–1076, 2015.

[14] A. P. Bates, Z. Khalid, and R. A. Kennedy, 'Slepian spatial-spectral concentration problem on the sphere: Analytical formulation for limited colatitude--longitude spatial region', IEEE Transactions on Signal Processing, vol. 65, no. 6, pp. 1527–1537, 2016.

[15] A. P. Bates, Z. Khalid, and R. A. Kennedy, 'Efficient computation of Slepian functions for arbitrary regions on the sphere', IEEE Transactions on Signal Processing, vol. 65, no. 16, pp. 4379–4393, 2017.

[16] U. Elahi, Z. Khalid, R. A. Kennedy, and J. D. McEwen, 'An Optimal-Dimensionality Sampling for Spin- s Functions on the Sphere', IEEE Signal Processing Letters, vol. 25, no. 10, pp. 1470–1474, 2018.

[17] W. Nafees, Z. Khalid, and R. A. Kennedy, 'Differential and weighted Slepian concentration problems on the sphere', IEEE Transactions on Signal Processing, vol. 68, pp. 2830–2840, 2020.

[18] A. Aslam and Z. Khalid, 'Localized analysis of signals on the sphere over polygon regions', IEEE Transactions on Signal Processing, vol. 68, pp. 4568–4582, 2020.

[19] A. Aslam, Z. Khalid, and J. D. McEwen, 'Multiscale optimal filtering on the sphere', IEEE Signal Processing Letters, vol. 28, pp. 394–398, 2021.

[20] A. Aslam and Z. Khalid, 'Spatial-Slepian transform on the sphere', IEEE Transactions on Signal Processing, vol. 69, pp. 4474–4485, 2021.

[21] A. Aslam and Z. Khalid, 'Joint SO(3)-Spectral Domain Filtering of Spherical Signals in the Presence of Anisotropic Noise', IEEE Signal Processing Letters, vol. 27, pp. 2109–2113, 2020.

[22] A. Aslam and Z. Khalid, 'Linear transformations and signal estimation in the joint spatial-slepian domain', IEEE Signal Processing Letters, vol. 28, pp. 1195–1199, 2021.

[23] S. Durrani, J. Guo, and Z. Khalid, 'Mathematica and Matlab software for computing distance distributions,' May, 2015.

[24] S. Imran, M. Tahir, Z. Khalid, and M. Uppal, "A Deep Unfolded Prior-Aided RPCA Network for Cloud Removal", IEEE Signal Processing Letters, vol. 29, pp. 2048–2052, 2022.

[25] M. O. Tarar, I. H. Naqvi, Z. Khalid, and M. Pecht, 'Accurate prediction of remaining useful life for lithium-ion battery using deep neural networks with memory features', Frontiers in Energy Research, vol. 11, 2023.

[26] A. Kayani, G. K. Woodward, Z. Khalid, and I. H. Naqvi, 'On the performance of hybrid beamforming for closely-spaced and randomly located users', Wireless Networks, pp. 1–9, 2023.

[27] A. Aslam and Z. Khalid, "Overcomplete Multiscale Dictionary of Slepian Functions for HEALPix on the Sphere," IEEE Transactions on Signal Processing, vol. 71, pp. 2532–2547, 2023.

[28] Y. Song, Z. Khalid, and M. Genton, "Efficient stochastic generators with spherical harmonic transformation for high-resolution global climate simulations from CESM2-LENS2", Journal of the American Statistical Association, 119(548), 2493–2507, 2024.

[29] J. Chowdhury, Z. Khalid, and M. Genton, "Fast and Accurate Spherical Harmonic Transform for Spatio-temporal Regular Grid Data," IEEE Signal Processing Letters vol. 31, pp. 1825-1829, 2024.

[30] S. Khan, S. Nadeem, and Z. Khalid, "Efficient Sampling and Accurate Reconstruction of Order-Limited Spherical Signals," IEEE Signal Processing Letters, vol. 32, pp. 746-750, 2025

[31] Song, Yan, Zubair Khalid, and Marc G. Genton, "Online stochastic generators using Slepian bases for regional bivariate wind speed ensembles from ERA5." Journal of the American Statistical Association (accepted with major revision), 2024 arXiv:2410.08945.

[32] M.A. Rahman, M.A. Basheer, Z. Khalid, M. Tahir, M. Uppal, "Logistics Hub Location Optimization: A K-Means and P-Median Model Hybrid Approach Using Road Network Distances," Transportation Research Procedia, Volume 84, pp. 219-226, 2025, ISSN 2352-1465

[33] S. Khan and Z. Khalid, "Slepian Basis for Efficient Representation of Order-Limited Signals on the Sphere," IEEE Transactions on Signal Processing, 2025 (Submitted)

[34] A. Toor and Z. Khalid, "Assessing the impact of industrial areas on land surface temperature: A comparison with urban and green spaces in the context of global warming", Sustainable Cities and Society, 2026.

Conference Publications

[35] Z. Khalid, S. Durrani, R. A. Kennedy, and P. Sadeghi, 'On the construction of low-pass filters on the unit sphere', in 2011 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2011, pp. 4356–4359.

[36] W. Huang, Z. Khalid, and R. A. Kennedy, 'Efficient computation of spherical harmonic transform using parallel architecture of CUDA', in 2011 5th International Conference on Signal Processing and Communication Systems (ICSPCS), 2011, pp. 1–6.

[37] Z. Khalid, S. Durrani, R. A. Kennedy, and P. Sadeghi, 'Revisiting Slepian concentration problem on the sphere for azimuthally non-symmetric regions', in 2011 5th International Conference on Signal Processing and Communication Systems (ICSPCS), 2011, pp. 1–7.

[38] Z. Khalid, S. Durrani, P. Sadeghi, and R. A. Kennedy, 'Concentration uncertainty principles for signals on the unit sphere', in 2012 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2012, pp. 3717–3720.

[39] Z. Khalid, R. A. Kennedy, S. Durrani, and P. Sadeghi, 'Conjugate gradient algorithm for extrapolation of sampled bandlimited signals on the 2-sphere', in 2012 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2012, pp. 3825–3828.

[40] Z. Khalid, S. Durrani, P. Sadeghi, and R. A. Kennedy, 'Ambiguity function and Wigner distribution on the sphere', in 2012 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2012, pp. 3405–3408.

[41] S. Durrani, Z. Khalid, and J. Guo, 'A tractable framework for exact probability of node isolation in finite wireless sensor networks', Cornell Univ. , Ithaca, NY, USA, ArXiv Tech. Rep. [Online]. Available: http://arxiv. org/abs/1212. 1283, 2012.

[42] R. A. Kennedy, P. Sadeghi, and Z. Khalid, "Optimal signal processing on the 2-sphere: A general operator approach to signal recovery," in International Biomedical and Astronomical Signal Processing (BASP) Frontiers workshop, 2013.

[43] Z. Khalid and S. Durrani, 'Connectivity of three-dimensional wireless sensor networks using geometrical probability', in 2013 Australian Communications Theory Workshop (AusCTW), 2013, pp. 47–51.

[44] J. Guo, S. Durrani and Z. Khalid, "Exact Probability of Node Isolation in Finite Wireless Sensor Networks," in 14th Australian Communications Theory Workshop (AusCTW), 2013.

[45] R. A. Kennedy, P. Sadeghi, Z. Khalid, and J. D. McEwen, 'Classification and construction of closed-form kernels for signal representation on the 2-sphere', in Wavelets and sparsity XV, 2013, vol. 8858, pp. 169–183.

[46] Z. Khalid, R. A. Kennedy, and P. Sadeghi, 'Efficient computation of commutative anisotropic convolution on the 2-sphere', in 2012 6th International Conference on Signal Processing and Communication Systems, 2012, pp. 1–7.

[47] Z. Khalid, R. A. Kennedy, P. Sadeghi, and S. Durrani, 'Spatio-spectral formulation and design of spatially varying filters for signal estimation on the 2-sphere', in Wavelets and Sparsity XV, 2013, vol. 8858, pp. 156–168.

[48] R. A. Kennedy, Z. Khalid, and Y. F. Alem, 'Spatial correlation from multipath with 3D power distributions having rotational symmetry', in 2013, 7th International Conference on Signal Processing and Communication Systems (ICSPCS), 2013, pp. 1–7.

[49] Z. Khalid, R. A. Kennedy, and S. Durrani, 'On the choice of window for spatial smoothing of spherical data', in 2014 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2014, pp. 2644–2648.

[50] Y. F. Alem, Z. Khalid, and R. A. Kennedy, 'Band-limited extrapolation on the sphere for signal reconstruction in the presence of noise', in 2014 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2014, pp. 4141–4145.

[51] P. Sadeghi, R. A. Kennedy, and Z. Khalid, 'Minimum mean square error equalization on the 2-sphere', in 2014 IEEE Workshop on Statistical Signal Processing (SSP), 2014, pp. 101–104.

[52] Z. Khalid, R. A. Kennedy, S. Durrani, and P. Sadeghi, 'Adaptive multi-resolution windowing technique for localized spatio-spectral analysis', in 2014 IEEE Workshop on Statistical Signal Processing (SSP), 2014, pp. 41–44.

[53] R. A. Kennedy, Z. Khalid, and P. Sadeghi, 'Efficient kernel-based formulations of spatio-spectral and related transformations on the 2-sphere', in 2014 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2014, pp. 310–314.

[54] Z. Khalid and R. A. Kennedy, 'Iterative method to compute the maximal concentration Slepian band-limited eigenfunction on the sphere', in 2014 8th International Conference on Signal Processing and Communication Systems (ICSPCS), 2014, pp. 1–8.

[55] Z. Khalid and R. A. Kennedy, 'On the placement of latitudes in iso-latitude optimal-dimensionality sampling schemes on the sphere', in 2014 8th International Conference on Signal Processing and Communication Systems (ICSPCS), 2014, pp. 1–7.

[56] Z. Khalid and R. A. Kennedy, 'Maximal multiplicative spatial-spectral concentration on the sphere: Optimal basis', in 2015 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2015, pp. 4160–4164.

[57] A. P. Bates, Z. Khalid and R. A. Kennedy, "An Optimal Dimensionality Sampling Scheme on the Sphere for Antipodal Signals in Diffusion Magnetic Resonance Imaging," in 2015 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2015

[58] Z. Khalid and R. A. Kennedy, 'Spherical harmonic transform for minimum dimensionality regular grid sampling on the sphere', in 2015 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2015, pp. 3656–3660.

[59] A. P. Bates, Z. Khalid, and R. A. Kennedy, 'On the use of Slepian functions for the reconstruction of the head-related transfer function on the sphere', in 2015 9th International Conference on Signal Processing and Communication Systems (ICSPCS), 2015, pp. 1–7.

[60] A. P. Bates, Z. Khalid, and R. A. Kennedy, 'On the use of antipodal optimal dimensionality sampling scheme on the sphere for recovering intra-voxel fibre structure in diffusion MRI', in Computational Diffusion MRI: MICCAI Workshop, Munich, Germany, October 9th, 2015, 2016, pp. 75–86.

[61] U. Elahi, Z. Khalid, and R. A. Kennedy, 'Comparative analysis of geometrical properties of sampling schemes on the sphere', in 2016 10th International Conference on Signal Processing and Communication Systems (ICSPCS), 2016, pp. 1–7.

[62] A. P. Bates, , Z. Khalid, R. A. Kennedy, and J. D. McEwen. "Multi-shell sampling scheme with accurate and efficient transforms for diffusion MRI." In Biomedical and Astronomical Signal Processing Frontiers (BASP).2017.

[63] A. P. Bates, Z. Khalid, J. D. McEwen, and R. A. Kennedy, 'An optimal dimensionality multi-shell sampling scheme with accurate and efficient transforms for diffusion MRI', in 2017 IEEE 14th International Symposium on Biomedical Imaging (ISBI 2017), 2017, pp. 770–773.

[64] Y. Sattar, Z. Khalid, and R. A. Kennedy, 'Robust reconstruction of spherical signals with finite rate of innovation', in 2017 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2017, pp. 4024–4028.

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Professional Service

Membership

- Associate Editor, IEEE Signal Processing Letters
- Senior Member, IEEE (2010-present)
- Member, IEEE Signal Processing Society (2010-present)
- Member, IEEE Industrial Applications Society (2019-Present)
- Life Member, Khwarizmi Science Society

Referee Service

- IEEE Transactions on Signal Processing
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- IEEE Transactions on Vehicular Technology
- ACM Transactions on Sensor Networks

- Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)
- International Conference on Signal Processing and Communication Systems (ICSPCS)
- International Symposium on Biomedical imaging (ISBI)