

Syed Muhammad Kazim

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Projects: [To be updated](#)

Education

- **University of Siegen, Germany** Jul. 2023 – Present
PhD in Engineering
Department of Electrical Engineering and Computer Science
Supervisor: [Prof. Ivo Ihrke](#)
- **Kyung Hee University, Korea** Sep. 2019 – Feb. 2022
Master of Engineering
Department of Electronic Engineering
Supervisor: [Prof. Hyundong Shin](#)
GPA: 4.21/4.30
- **National University of Sciences and Technology, Pakistan** Sep. 2014 – Jul. 2018
Bachelor of Engineering
Department of Electrical Engineering
GPA: 3.51/4.00

Projects

- **Coded wavefront sensing: Modeling, optimization, and prototyping (ongoing).**
 1. Modeled scalar wave propagation through thin scatterers to analyze speckle field variations and establish relationships with structure size and arrangement of the scatterers.
 2. Developing a differentiable optimization framework for tuning microstructured phase elements and identifying effective design parameters.
 3. Conducting experiments with phase structures of varying refractive indices and sizes to characterize speckle behavior and validate physical simulation models.
- **Refractive index tomography using coded wavefront sensing.**
 1. Recorded speckle fields of a rotating HEK cell at 30 fps, with a single system reference for phase retrieval using coded wavefront sensing.
 2. Estimated the scattering potential of the HEK cell to assess the feasibility of the Fourier diffraction theorem for refractive index tomography.
 3. Applied spatial filtering techniques to mitigate specimen jitter and pose uncertainty, enabling tomographic reconstruction using standard algorithms.
- **Experimental performance validation of coded wavefront sensor.**
 1. Simulated a 10 μm spherical silica bead immersed in PBS to create a ground truth for measurements using the beam propagation method.
 2. Mapped the retrieved wavefields to the object space and propagated them to the same focus plane, enabling comparison of digital holographic microscopy, coded wavefront sensing, and simulation.
 3. Performed comparative analysis by accurately overlaying wavefields retrieved by different methods and quantifying pixel-wise distances in their optical path differences.

Publications

1. **S. Kazim**, F. Strasser, M. Løvmo, A. Nehrych, S. Moser, M. Ziemczonok, W. Heidrich, I. Ihrke, and M. Ritsch-Marte, "[Coded wavefront sensing for video-rate quantitative phase imaging and tomography: validation with digital holographic microscopy](#)," *Submitted to Opt. Express*, Apr. 2025.
2. **S. Kazim**, F. Strasser, M. Løvmo, A. Nehrych, S. Moser, M. Ziemczonok, W. Heidrich, I. Ihrke, and M. Ritsch-Marte, "Performance validation of coded wavefront sensing for quantitative phase imaging of static and dynamic Specimens using digital holographic microscopy," *International Symposium on Computational Sensing (ISCS)*, Mar. 2025.
3. N. Agarwal, J. Schneider, K. Gandikota, **S. Kazim**, J. Meshreki, I. Ihrke, and M. Moeller, "Direct image classification from Fourier ptychographic microscopy measurements without reconstruction," *International Symposium on Computational Sensing (ISCS)*, Mar. 2025.
4. J. Meshreki, **S. Kazim**, and I. Ihrke, "[Optical system characterization in Fourier ptychographic microscopy](#)," *Opt. Continuum*, Dec. 2024.
5. K. Bäuerle, P. Müller, **S. Kazim**, I. Ihrke, and M. Keuper, "[Learning the essential in less than 2k additional weights - a simple approach to improve image classification stability under corruptions](#)," *Transactions on Machine Learning Research*, Jun. 2024.
6. **S. Kazim**, A. Farooq, J. ur Rehman, and H. Shin, "[Adaptive quantum state tomography with iterative particle filtering](#)," *Quantum Inf. Process.*, Sep. 2021.
7. **S. Kazim**, A. Farooq, J. ur Rehman, and H. Shin, "[Applied Bayesian Qubit State Tomography](#)," *Proc. Korea Information and Communications Society (KICS) Summer Conference*, pp. 190-192 Korea, Aug. 2020.

Talks and Oral Presentations

1. (3rd Prize) S. M. Kazim, "Refractive index tomography of biological cells with coded phase camera," *ZESS PhD. Forum*, Siegen, May 2025.

Poster Presentations

1. S. M. Kazim, "Exposition: Wavefront sensing for quantitative phase imaging," *88th Heidelberg Image Processing Forum - ZESS Open Day*, Siegen, Nov. 2024.
2. (Best Poster Award) S. M. Kazim, J. Meshreki, and I. Ihrke, "Roadmap: Super-resolution of phase objects," *ZESS PhD. Forum*, Siegen, May 2024.

Co-supervised Projects

1. S. L. Bussu, S. M. Kazim, and I. Ihrke, "Python-based GUI for real-time digital holography system optimization," *Studienarbeit Project*, University of Siegen, Nov. 2024.

Work Experience

- **University of Siegen, Siegen, Germany** Jul. 2023 – Present
Graduate Research Assistant
Chair of Computational Sensorics/Communication Engineering
Experimental and algorithmic design, and optimization of quantitative phase imaging methods with special focus on *coded wavefront sensing*.
- **Endress+Hauser, Maulburg, Germany** Oct. 2021 – Jun. 2023
External AI Consultant
Vision-based automation to preclude human intervention in quality control tasks in industry

- **Kyung Hee University, Yongin-si, Korea**
Graduate Research Assistant
 Communications and Coding Theory Laboratory

Sep. 2019 – Feb. 2022
- **National University of Sciences and Technology, Karachi, Pakistan**
Research Engineer

Aug. 2018 – Aug. 2019

Theses

1. S. M. Kazim, “Adaptive Learning of Quantum Digits,” Master’s thesis, Department of Electrical and Information Convergence Engineering, Kyung Hee University, Yongin-si, Korea, Feb. 2022, Thesis Advisor: Professor Hyundong Shin.
2. S. M. Kazim, “Frequency Reconfigurable Patch Antenna using Liquid Crystals,” Bachelor’s thesis, Department of Electrical Engineering, National University of Sciences and Technology, Islamabad, Pakistan, Jul. 2018, Thesis Advisor: Professor Zubair Ahmed.

References

1. [Prof. Ivo Ihrke](#)
Designation: Chair of Computational Sensing/Communication Engineering
Affiliation: University of Siegen
Email: ivo.ihrke@uni-siegen.de
2. [Prof. Monika Ritsch-Marte](#)
Designation: Director of the Institute of Biomedical Physics
Affiliation: Medical University of Innsbruck
Email: monika.ritsch-marte@i-med.ac.at
3. [Prof. Margret Keuper](#)
Designation: Chair of Computer Vision and Machine Learning Group
Affiliation: University of Mannheim
Email: margret.keuper@uni-mannheim.de