

# SYED IBRAR HUSSAIN

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[syedhussain.ibrar@gmail.com](mailto:syedhussain.ibrar@gmail.com) | **Website:** <https://orcid.org/0000-0002-9391-3858> | **Website:** <https://github.com/ibrar-syed> |

**LinkedIn:** <https://www.linkedin.com/in/dr-syed-ibrar-hussain/> | **Address:** Via Vincenzo Madonia 79, 90128, Palermo, Italy (Work)

## ● ABOUT ME

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Advancing resilient deep learning systems for complex visual data through architectural innovation and scalable optimization. Specialized in developing adaptive neural architectures (CNNs, GANs, Diffusion Networks) for diagnostic imaging and behavioral pattern recognition. Demonstrated proficiency in distributed high-performance computing (SLURM/CUDA) and strategies against model vulnerabilities.

## ● EDUCATION AND TRAINING

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01/11/2021 – 27/02/2025 Palermo, Italy

**PH.D. IN MATHEMATICS AND COMPUTER SCIENCES** University of Palermo, Italy

- Advanced expertise in deep learning for computer vision systems, with specialization in diagnostic imaging pipelines.
- Designed and optimized CNN models for image detection, segmentation, and classification
- Skilled in model development: feature engineering, hyperparameter tuning, validation, and inference
- Developed dynamic causal modeling frameworks for spatiotemporal pattern recognition in volumetric image sequences.
- Worked on nonlinear differential equations in biological and physical systems.
- Scaled diffusion models for high-resolution image segmentation using SLURM-based HPC clusters
- Proficient in Python computer vision stack (TensorFlow/Keras, OpenCV, scikit-image) for imaging pipelines
- Hands-on experience with Linux systems for research computing, environment setup, package management, and model deployment workflows.

**Address** Via Archirafi 34, 90123, Palermo, 90123, Palermo, Italy |

**Thesis** Advanced Learning Algorithms with Optimized Pre-processing Techniques for Enhanced Diagnostic Performance in Medical Imaging

01/01/2024 – 02/10/2024 Houston, United States

**RESEARCH SCHOLAR IN MATHEMATICS** University of Houston, Houston

- Developed volumetric image preprocessing pipelines with artifact reduction, spatial normalization, and noise suppression using specialized imaging tools
- Implemented signal enhancement techniques (FFT, adaptive filtering) for feature refinement in temporal-spatial data streams
- Designed ensemble-based prediction systems using Random Forests for complex pattern recognition tasks
- Architected Linux-based data processing workflows for large-scale dataset management (10TB+)
- Configured GPU-accelerated HPC environments for distributed deep learning (TensorFlow/PyTorch)
- Created multimodal fusion frameworks integrating imaging, signal, and contextual metadata
- Collaborated with cross-functional teams on computer vision and research is published in peer-reviewed journals.

**Address** 651 Phillip G Hoffman Houston, TX , 77204-3008, Houston, United States

20/10/2017 – 20/09/2019 Gujrat, Pakistan

**MASTER'S DEGREE IN APPLIED MATHEMATICS** University of Gujrat

- Designed and implemented Numerical methods for solving complex PDEs in quantum mechanics and fluid dynamics.
- Developed numerical techniques addressing singularities and boundary problems with high precision.
- Conducted stability and convergence analyses to ensure reliable and accurate computational solutions.
- Modeled nonlinear wave propagation and oxygen diffusion, providing insights into applied physics and biology.
- Advanced computational expertise in numerical methods for scientific and real-world applications.

**Field of study** Applied Mathematics | **Final grade** 3.91/4.0 | **Level in EQF** EQF level 7 |

**Thesis** Numerical Approach for Solution of Differential Equations

02/2022 – 09/2022

**AI FOR MEDICAL DIAGNOSIS** Coursera (A series of Short Courses on Deep Learning and CNN)

The courses has

- Provided valuable practical experience in applying advanced machine learning techniques to real-world diagnostic problems.
- Enhanced my understanding of deep neural networks, with a focus on convolutional networks.
- Strengthened my proficiency in Python programming.

**Website** <https://coursera.org/share/7ebf3fb004ad2d483ff21b8c38c11798>

## WORK EXPERIENCE

### SCIENTIFIC RESEARCHER – FONDAZIONE RI.MED – 01/11/2024 – Current – PALERMO, ITALY

- Developed multi-modal vision systems for anomaly detection in complex structures using volumetric imaging
- Implemented deep generative architectures (GANs, CNNs, Diffusion Networks) for precision recognition tasks
- Designed noise-robust preprocessing pipelines for MRI/PET, reducing artifacts.
- Created multi-task frameworks improving detection accuracy for overlapping morphological features
- Exploring explainable AI (XAI) methods to improve model transparency and critical decision systems.
- Collaborating with domain specialists to operationalize vision solutions in regulated environments
- Engaging in research and publications to advance AI applications in medical imaging.

### MATHEMATICS LECTURER – UNIVERSITY OF GUJRAT – 01/11/2019 – 10/10/2021 – GUJRAT, PAKISTAN

- Designed and delivered advanced computational mathematics curriculum covering PDEs, optimization, and numerical analysis
- Created Python-based coursework for scientific computing applications and mentored student's projects on ML implementations using NumPy/SciPy
- Provide a supportive and engaging learning environment to promote student engagement and achievement.

## SKILLS

CNNs, GANs, diffusion models, transfer learning, multi-output regression, model validation. | Python (NumPy, Pandas, Matplotlib), TensorFlow / Keras, PyTorch, OpenCV, scikit, CUDA, SLURM, Git | Docker Container Architecture | Large dataset handling, preprocessing pipelines, reproducible experiments | Evaluation metrics (classification/regression), spatial & spatiotemporal modeling. | R (Tidyverse, Bioconductor)

## PUBLICATIONS

05/01/2025

### Articles

1. Hussain, S. I., & Toscano, E. (2025). Enhancing Recognition and Categorization of Skin Lesions with Tailored Deep Convolutional Networks and Robust Data Augmentation Techniques. *Mathematics*, 13(9), 1480. <https://doi.org/10.3390/math13091480>.
2. Hussain, S. I., & Toscano, E. (2025). Optimized Deep Learning for Mammography: Augmentation and Tailored Architectures. *Information*, 16(5), 359. <https://doi.org/10.3390/info16050359>.
3. Di Re, J., Marini, M., Hussain, S.I., Singh, A.K., Venkatesh, A., Alshammari, M.A., Alshammari, T.K., Hamoud, A.R.A., Imami, A.S., Haghhighjoo, Z. and Fularcyzk, N., 2025.  $\beta$ IV spectrin abundancy, cellular distribution and sensitivity to AKT/GSK3 regulation in schizophrenia. *Molecular Psychiatry*, pp.1-13.
4. Huang, Y., Hussain, S.I., Labate, D., Azencott, R., Thompson, P., Adhikari, B. and Kochunov, P., 2024. Exploring the Granularity of the Illnesses-Related Changes in Regional Homogeneity in Major Depressive Disorder using the UKBB Data. In *Biocomputing 2025: Proceedings of the Pacific Symposium* (pp. 647-663). [https://doi.epdf/10.1142/9789819807024\\_0046](https://doi.epdf/10.1142/9789819807024_0046)
5. P. Kochunov, B. Adhikari, D. Keator, D. Amen, S. Gao, N. Karcher, D. Labate, R. Azencott, Y. Huang, H. Syed, H. Ke, P. Thompson, D. Wang, B. Mitchell, J. Turner, T. van Erp, N. Jahanshad, Y. Ma, X. Du, W. Burroughs, S. Chen, T. Ma, J. Soares, E. Hong, 2025. Functional vs Structural Cortical Deficit Pattern Biomarkers for Major Depressive Disorder. *JAMA psychiatry*. 10.1001/jamapsychiatry.2025.0192
6. Kumar, R., Corvisieri, G., Fici, T. F., Hussain, S. I., Tegolo, D., & Valenti, C. (2025). Transfer Learning for Facial Expression Recognition. *Information*, 16(4), 320. <https://doi.org/10.3390/info16040320>
7. Hussain, S.I. and Toscano, E., 2024. An extensive investigation into the use of machine learning tools and deep neural networks for the recognition of skin cancer: challenges, future directions, and a comprehensive review. *Symmetry*, 16(3), p. 366. <https://doi.org/10.3390/sym16030366>
8. Kumar, R. and Hussain, S.I., 2024. A Review of the Deep Convolutional Neural Networks for the Analysis of Facial Expressions. *Journal of Innovative Technology*, 6(1), pp.41-49. [10.29424/JIT.202403\\_6\(1\).0004](https://doi.org/10.29424/JIT.202403_6(1).0004).

Link <https://www.researchgate.net/profile/Syed-Ibrar-Hussain-2>

## LANGUAGE SKILLS

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
<b>ENGLISH</b>	C1	C1	C1	C1	C2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

## CONFERENCES & WORKSHOPS

29/05/2025

### Applications of Advanced Deep Learning Approaches for Accurate Prostate Segmentation in Medical Imaging

Invited seminar delivered at the Radiomics and Imaging Group, Ri.MED Foundation, Palermo, Italy (May 29, 2025), titled "Applications of Advanced Deep Learning Approaches for Accurate Prostate Segmentation in Medical Imaging," highlighting the clinical relevance of generative AI models.

03/09/2025 – 05/09/2025

### Prostate MRI Segmentation: A Comparative Analysis of advanced Deep Learning Models

Work presented by the Radiomics and Imaging Group, Ri.MED Foundation (Palermo, Italy), at the International Conference on Image Analysis and Processing (**ICIAP 2025**), Rome, Italy.

19/09/2024 – 20/09/2024

### 6th Annual GCC Mental Health Research Conference

held at Bioscience Research Collaborative, 6500 Main Street Auditorium Houston, TX 77030 United States.

18/06/2023 – 22/06/2023

### NODYCon 2023 Rome, Italy

Oral presentation of the Research Article Titled: "Hussain, S.I., Ahmad, I., Yasmeen, N. (2024). The Remarkable Role of Hydrogen in Conductors with Copper and Silver Nanoparticles by Mixed Convection Using Viscosity Reynold's Model. In: Lacarbonara, W. (eds) Advances in Nonlinear Dynamics, Volume I. ICNDA 2023. NODYCON Conference Proceedings. Springer, Cham. 10.1007/978-3-031-50631-4\_5" presented at the conference at the Sapienza University of Rome, Italy.

## SCHOLARSHIPS & AWARDS

### FELLOWSHIPS & SCHOLARSHIPS

2021-2024 **Fully Funded PhD Scholarship** • University of Palermo

(Top 5% international selection)

2017-2019 **Graduate Gold Medalist in Applied Mathematics** | Top-ranked cohort graduate • University of Gujarat  
(Academic and Research Excellence Gold Medal)

2015-2017 **Merit-Based Graduate Scholarship** • Punjab Education Endowment Fund  
(Awarded to top 2% of students)

## RESEARCH INTERESTS

### Research Interests

- **Medical Vision Intelligence:** Developing novel neuroimaging analysis frameworks for psychiatric biomarker discovery, dermatological computational pathology, and multimodal diagnostic integration.
- **Adaptive Learning Systems:** Architecting reinforcement mechanisms for dynamic decision optimization in resource-constrained environments.
- **Structured Representation Learning:** Creating hybrid clustering architectures that fuse geometric priors with deep feature embeddings for unsupervised pattern discovery.
- **Vision-Centric Model Engineering:** Designing task-optimized convolutional and generative architectures for precision recognition in imaging pipelines (classification/detection/segmentation).
- **Computational Dynamics Modeling:** Formulating operator-theoretic approaches for high-dimensional differential systems in biological processes.

## RECOMMENDATIONS

**Prof. Calogero Vetro** Ph.D. Research Supervisor

Associate Professor, Department of Mathematics and Computer Science, University of Palermo, Italy.

Email [calogero.vetro@unipa.it](mailto:calogero.vetro@unipa.it)

**Prof. Elena Toscano** Co Supervisor

Assistant Professor, Department of Mathematics and Computer Science, University of Palermo, Italy.

Email [elena.toscano@unipa.it](mailto:elena.toscano@unipa.it)