



Hosting interns  
at  
The University of Stirling  
under the  
SPECIES Society Scholarships Program  
Dr. Hazrat Ali  
University of Stirling, United Kingdom

**Table of Contents**

<i>One-page CV</i> .....	1
<i>Description of the project</i> .....	2
<i>Description of the research group</i> .....	3
<i>Additional information</i> .....	4
Support .....	4
Location .....	4
Accommodation .....	4

# One-page CV

**Dr. Hazrat ALI**

**Royal Academy of Engineering - Endorsed Global Talent in Artificial Intelligence**

**Lecturer in Artificial Intelligence/Data Science, University of Stirling, Stirling, UK.**

**Senior Member IEEE, Fellow of Advance HE, UK.**

**Global Ambassador, Global Council for Responsible AI.**

2020/2021 Best Researcher Award by COMSATS University,

Good DeepMind MenaML winter school grant winner, DAAD AI-Net Fellow 2021, Young Researcher at

Heidelberg Laureate Forum 2021 and 2017, Erasmus Mundus Scholar 2014, IBRO Alumnus, Ex-Advisor

on Science & Technology projects @ Directorate of Science & Technology, Govt. of KPK, Pakistan.

Expert Evaluator of Grant Proposals at Marie Skłodowska-Curie postdoc fellowships (Horizon Europe),

NIHR UK, SyMeCo (a Marie Skłodowska-Curie fellowship at LERO Ireland).

## USEFUL LINKS:

**Webpage:** <https://hazrat.ali.github.io/> <https://www.stir.ac.uk/people/1987004>

**Google scholar:** <https://scholar.google.com/citations?user=GQhyFYAAAAAJ&hl=en&oi=ao>

**ORCID:** <https://orcid.org/0000-0003-3058-5794>

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## RESEARCH INTERESTS

Artificial Intelligence, Neural Networks, Generative Adversarial Networks, Medical Imaging.

Applications: Digital Health, Artificial Intelligence in Healthcare, Healthcare Data Analytics.

## WORK EXPERIENCE

**August 2024 – present**                      **Lecturer in AI/Data Science**, Division of Computing Science and Mathematics, University of Stirling, United Kingdom.

- ◆ Research and Teaching in Artificial Intelligence. Modules: Machine Learning, Databases.

**July 2021 – April 2024**                      **Researcher, College of Science and Engineering, Hamad Bin Khalifa University, Doha, Qatar.**

- ◆ I performed research on **Artificial Intelligence for Healthcare and Medical Imaging** and contributed to training PhD and Masters' students on artificial intelligence.

**January 2020 – July 2021**                      **Senior Researcher/Postdoc, Biomedical Engineering R & D, Umea University Hospital & Department of Radiation Sciences, Umea University, Umea, Sweden.**

- ◆ I performed research on **Artificial Intelligence for ultrasound images** and developed GANs methods for ultrasound image synthesis, and contributed to writing proposals for research grants proposals that were submitted to Swedish Research Council, Heart & Lung Foundation of Sweden.

**September 2015 – June 2022**                      **Assistant Professor, Department of Electrical and Computer Engineering, COMSATS University Abbottabad Campus, Abbottabad, Pakistan.**

- ◆ I taught **Machine Learning, Digital Signal Processing, Signals & Systems**, and Python Programming, and supervised a number of postgraduate theses.

## ACTIVITIES

- ◆ **Thesis Supervision:** I have **supervised and co-supervised** 19+ postgraduate students and multiple undergraduate students.
- ◆ **Book Editor @ Springer, Associate Editor @ Wiley Applied AI Letters, Nature Sci. Reports, IEEE**
- ◆ **Guest Editor (2023) Frontiers in Artificial Intelligence and Frontiers in Radiology journals.**
- ◆ **Lead Guest editor (2024), Multimodal AI in Healthcare, AI journal.**
- ◆ **Lead organizer and chair**, Multimodal Generative AI in Healthcare at 2025 and 2026 AI in Healthcare conference, Cambridge, UK. <https://aiih.cc/>
- ◆ **Area Chair**, 2026 and 2025 IEEE International Joint Conference on Neural Networks and 2026 IEEE ICASSP.
- ◆ **Workshop Chair**, Workshop on Foundation AI Models, at IEEE ISBI 2026, London, UK. <https://hazrat.ali.github.io/faibi2026/>

## Description of the project

### **Title: Neuroevolution of variable length denoising operators for diversity preserving medical image generation**

**Summary:** Deep Generative Models such as neural diffusion models and generative adversarial networks have largely enabled medical image data augmentation. Recent theoretical bridges have established that *Diffusion Models are mathematically equivalent to Evolutionary Algorithms (EAs)*, where the reverse denoising process acts as a directed selection mechanism through a fitness landscape [1]. However, static neural backbones often suffer from **premature convergence (data memorization)**, failing to explore the full diversity of medical phenotypes, particularly for underrepresented populations. Furthermore, the generation of synthetic medical data for individuals/populations with scarce representation or unique characteristics is often challenging. This project will investigate the **Neuroevolution of the denoising agent's topology**. Instead of fixed-length architectures, the project proposes a variable-length evolutionary network to serve as the backbone for neural diffusion models. By evolving the network's depth and connectivity, the approach allows the generative evolutionary process to adapt its complexity to the rarity of the data, effectively navigating rugged fitness landscapes to discover diverse, high-quality synthetic samples.

To validate the **biological fidelity and functional fitness** of the evolved synthetic population, the generated data will be evaluated via downstream segmentation benchmarks (nnUNet/MedSAM2). The project will help the research internee explore concepts in generative models for medical images and gain skills in handling complex data while working on cutting-edge research. The internee will gain expertise in **Neuroevolutionary strategies**, population-based generative modelling, with exposure to medical imaging tools (MONAI, PyTorch, 3D-Slicer), contributing to the emerging frontier of **Diffusion Evolution**.

- [1]. Zhang, Y., Hartl, B., Hazan, H. and Levin, M., 2025. Diffusion models are evolutionary algorithms. *International Conference on Learning Representations 2025 (ICLR 2025)*, pp. 7487 – 4894.

## Description of the research group

The internee will be hosted at the Data Analytics and Intelligent System (DAIS) research group and the Healthcare AI+Medical Imaging (HAIMI) Lab (led by Hazrat), in the Division of Computer Science and Mathematics at the University of Stirling. The DAIS research group has expertise in evolutionary algorithms, machine learning, computer vision, and optimization and actively contributes to theoretical development and applied research in healthcare and assistive technology. The group members actively publish their research in the *EvoStar*, *CVPR*, *GECCO*, and *IEEE Transactions on Evolutionary Computing*. The group is also leading the ARIA-TREND project (Two-Point Neurons-Inspired Economic and Ethical Neuromorphic Co-Design project) funded by The Advanced Research + Invention Agency (ARIA), UK. The TREND project is an ambitious initiative to achieve AI at less than 1/1000th of the cost by mimicking two-point neurons. More details on <https://cmilab.org/aichip/trend/>

The host supervisor is leading research on neural diffusion models, medical image segmentation, data augmentation, and generative AI models. Few representative research outcomes are listed here:

1. Khan S, Biswas MR, Murad A, Ali H & Shah Z (2024) An Early Investigation into the Utility of Multimodal Large Language Models in Medical Imaging. 2024 IEEE International Conference on Information Reuse and Integration for Data Science (IRI), San Jose, CA, USA, 07.08.2024-09.08.2024. <https://doi.org/10.1109/iri62200.2024.00056>
2. Ali H, Rehmani MH & Shah Z (eds.) (2023) *Advances in Deep Generative Models for Medical Artificial Intelligence*. Studies in Computational Intelligence. Cham: Springer Nature Switzerland. <https://doi.org/10.1007/978-3-031-46341-9>
3. Ali H, Mohsen F & Shah Z (2023) Improving diagnosis and prognosis of lung cancer using vision transformers: a scoping review. *BMC Medical Imaging*, 23, Art. No.: 129. <https://doi.org/10.1186/s12880-023-01098-z>
4. Hazrat Ali, Emma Nyman, Ulf Näslund, Christer Grönlund, Translation of atherosclerotic disease features onto healthy carotid ultrasound images using domain-to-domain translation, *Biomedical Signal Processing and Control*, Volume 85, March 2023. doi: 10.1016/j.bspc.2023.104886
5. **Hazrat Ali**, Johannes Umander, Robin Rohlén, Oliver Röhrle and Christer Grönlund, Modelling intra-muscular contraction dynamics using in silico to in vivo domain translation. *BioMed Eng OnLine* 21, 46 (2022). Doi: 10.1186/s12938-022-01016-4 doi: [10.1186/s12938-022-01016-4](https://doi.org/10.1186/s12938-022-01016-4)

Read more about the DIAS research group <https://dais.stir.ac.uk/>

## Additional information

The University of Stirling, renowned for its achievements in both teaching and research, has been recognized as Scotland's University for Sporting Excellence and has been recently shortlisted for the 2024 Times Higher Education University of the Year Award. The division of computing science and mathematics is home to leading researchers and faculty in the fields of Artificial Intelligence and Software Engineering. As a member of the Scottish Informatics and Computer Science Alliance (SICSA), the division is part of a prestigious Scotland-wide initiative focused on research and knowledge exchange.

## Support

The Division of Computing Science and Mathematics will provide the necessary resources and support during the proposed internship stay at the University of Stirling. The internee will have the opportunity to engage in various activities that promote cultural exchange with faculty, staff, students, and other research scholars, including participation in the weekly seminar series at the division and the DAIS research group's bi-weekly meetings.

## Location

The University of Stirling has a stunning 330-acre campus located in the heart of Scotland and is the gateway to the Highlands. Working at Stirling means you will be surrounded by the breathtaking green scenery. Stirling is full of beautiful green space, with lots of gardens and parks to discover. And even more breathtaking scenery is just a short car or train ride away. How to get to the campus? The University of Stirling's campus is just two miles from the centre of Stirling in central Scotland. The campus is served by excellent fast public transport links from Glasgow and Edinburgh and is easily accessible by bus, foot, and bike from Stirling city center or Bridge of Allan. More information is available here <https://www.stir.ac.uk/about/getting-here/>

## Accommodation

The university offers secure and affordable accommodation that includes over 2,800 rooms right on the beautiful campus, as well as easy-to-reach off-campus residences. More information is available on the dedicated webpage <https://www.stir.ac.uk/student-life/accommodation/>