

# CV

## AmirEhsan Khorashadizadeh

### PERSONAL INFORMATION

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### RESEARCH CAREER

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Visiting Researcher	London, UK
University College London (UCL)	(2023 - present)
Research Assistant	Basel, Switzerland
University of Basel	(2020 - present)

### Education

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Ph.D. In Data Science	Basel, Switzerland
University of Basel	(2020 - present)
M.Sc. In Electrical Engineering	Tehran, Iran
Sharif University of Technology (GPA: 18.52/20)	(2018 - 2020)
B.Sc. In Electrical Engineering	Tehran, Iran
University of Tehran (GPA: 17.01/20)	(2013 - 2018)

### Research Interests

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- Deep Learning
- Computational Imaging
- Generative Modeling
- Image Reconstruction

### Publications

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- [1] AmirEhsan Khorashadizadeh, Tobias Liaudat, Jason McEwen and Ivan Dokmanić. ‘MLPatch: Scalable Local Image Reconstruction.’ Under review in ICML 2024.
- [2] AmirEhsan Khorashadizadeh, Valentin Debarnot, Tianlin Liu and Ivan Dokmanić. ‘GLIMPSE: Generalized Local Imaging with MLPs.’ Preprint 2024 (available on [Arxiv](#)).
- [3] Tianlin Liu, Jose Antonio Lara Benitez, Florian Faucher, AmirEhsan Khorashadizadeh, Maarten V. de Hoop, and Ivan Dokmanić. ‘WaveBench: Benchmarks Datasets for Modeling Linear Wave Propagation PDEs.’ Transactions on Machine Learning Research (TMLR 2024) (available on [Open-Review](#)).
- [4] AmirEhsan Khorashadizadeh, Anadi Chaman, Valentin Debarnot and Ivan Dokmanić. ‘FunkNN: Neural Interpolation for Functional Generation.’ International Conference on Learning Representations (ICLR 2023) (available on [OpenReview](#) and [Arxiv](#)).
- [5] AmirEhsan Khorashadizadeh, Vahid Khorashadizadeh, Sepehr Eskandari, Guy A. E. Vandenbosch and Ivan Dokmanić. ‘Deep Injective Prior for Inverse Scattering.’ IEEE Transactions on Antennas and Propagation (available on [IEEE Xplore](#) and [Arxiv](#)).

- [6] AmirEhsan Khorashadizadeh, Konik Kothari, Leonardo Salsi, Ali Aghababaeiharandi, Maarten V. de Hoop and Ivan Dokmanić. ‘Conditional Injective Flows for Bayesian Imaging.’ IEEE Transactions on Computational Imaging (available on [IEEE Xplore](#) and [Arxiv](#)).
- [7] AmirEhsan Khorashadizadeh, Ali Aghababaei, Tin Vlašić, Hieu Nguyen and Ivan Dokmanić. ‘Deep Variational Inverse Scattering.’ European Conference on Antennas and Propagation (EUCAP 2023) (available on [IEEE Xplore](#) and [Arxiv](#)).
- [8] Tin Vlašić, Hieu Nguyen, AmirEhsan Khorashadizadeh and Ivan Dokmanić. ‘Implicit Neural Representation for Mesh-Free Inverse Obstacle Scattering.’ 56th Asilomar Conference on Signals, Systems, and Computers (available on [Arxiv](#)).
- [9] Kothari, Konik, AmirEhsan Khorashadizadeh, Maarten de Hoop, and Ivan Dokmanić. ‘Trumpets: Injective flows for inference and inverse problems.’ Uncertainty in Artificial Intelligence (UAI 2021) (available on [PMLR](#) and [Arxiv](#)).
- [10] Amir Ehsan Khorashadi-Zadeh, Massoud Babaie-Zadeh, and Christian Jutten. ‘A Novel Pruning Approach for Bagging Ensemble Regression Based on Sparse Representation.’ IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2020)(available on [IEEE Xplore](#)).

## Honors and Awards

- Research Fellowship by Promotion of Young Talent at the University of Basel (2023)
- Poster competition winner in [Maths4DL](#) conference, London (2023)
- Ranked 4<sup>th</sup> among 15000 participants in the master of electrical engineering exam (2018)
- Ranked 183<sup>th</sup> among 200,000 participants in the national university entrance exam (2013)

## Thesis

M.Sc. thesis: AmirEhsan Khorashadizadeh, “Pruning Machine Learning Models by Sparse Representation”, Dept. Elect. Eng., Sharif University of Technology, Tehran, Iran. (2019-2020)

Supervisor: Prof. Massoud Babaie-Zadeh

B.Sc. thesis: AmirEhsan Khorashadizadeh, “Speaker Recognition System”, Dept. Elect. Eng., University of Tehran, Tehran, Iran. (2017)

Supervisor: Prof. Mohammad Ali Akhaee

## Technical Skills

- Programming: Python, R
- Language Proficiency: English (Fluent)
- Tool/Software: PyTorch, Tensorflow, Matlab, Git, Pandas, OpenCV

## Research Experience

- Bayesian Modeling of Imaging Inverse Problems SADA Lab (2020-2023)
  - [Trumpets: Injective Flows for Inference and Inverse Problems:](#)  
We proposed injective normalizing flows called Trumpets with a low dimensional latent space making it a natural choice for solving ill-posed inverse problems, from image super-resolution and image in-painting to imaging problems.
  - [Conditional Injective Flows for Bayesian Imaging:](#)  
We developed a Bayesian framework, based on injective flows, for posterior sampling and uncertainty quantification of ill-posed imaging inverse problems. The proposed model can efficiently generate physically meaningful posterior samples over various imaging inverse problems including computed tomography (CT), seismic imaging, and inverse scattering.
  - [Deep Variational Inverse Scattering:](#)  
We introduced U-Flow, a Bayesian U-Net network based on conditional normalizing flows,

which generates high-quality posterior samples and estimates physically meaningful uncertainty. We show that the proposed model significantly outperforms the recent normalizing flows regarding posterior sampling while having comparable performance with the U-Net in point estimation.

- **Deep Injective Prior for Inverse Scattering:**

We developed an unsupervised framework for Bayesian modeling of inverse scattering problems based on deep generative models. With comparable performance with state-of-the-art deep learning methods like U-Net, our proposed framework can be used for posterior sampling and uncertainty quantification with strong performance on real experimental data.

- **Neural Fields**

**SADA lab & SciAI group (2022-present)**

- **FunkNN: Neural Interpolation for Functional Generation:**

We proposed a local continuous super-resolution network termed FunkNN that can recover the image at any arbitrary continuous coordinate and resolution. FunkNN generates high-quality continuous images and exhibits strong out-of-distribution performance thanks to its patch-based design.

- **GLIMPSE: Generalized Local Imaging with MLPs:**

In this project, we built a local processing network for CT image reconstruction. Our model, called Glimpse, has a strong generalization; it significantly outperforms standard CNNs on out-of-distribution data while maintaining a memory footprint almost independent of image resolution; 5GB memory suffices to train on  $1024 \times 1024$  images.

- **Single-cell RNA-seq in drug discovery**

**Roche (Aug 2022)**

In this collaborative project, our team employed various machine learning frameworks to facilitate single-cell drug discovery. We leveraged a random forest classifier to identify the cell types with more distinguishable cells between healthy and inflamed.

## Relevant Courses and Grades

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- **Graduate**

- Pattern Recognition: (17.3)
- DeepLearning: (20/20)
- Statistical Learning: (19.4/20)
- Discrete-time Signal Processing (DSP): (16.6/20)
- Computer Vision: (19/20)
- Numerical Optimization: (20/20)
- Model- and Learning-Based Inverse Problems in Imaging (ETH): (6/6)
- Statistical Models in Computational Biology (ETH): (5.5/6)

- **Undergraduate**

- Calculus: (19.25/20)
- Differential Equations: (20/20)
- Numerical Computations: (19.9/20)
- Engineering Mathematics: (18/20)
- Engineering Probability & Statistics: (18.5/20)
- Linear Control Systems: (19.1/20)
- Systems Analysis: (18.3/20)