



Fuzhan Rahmanian

WORK EXPERIENCE

Karlsruhe Institute of Technology (KIT) (01/2020 - Present)
PoLiS Cluster of Excellence
Doctoral Student

- Development of an automated material acceleration platform as part of **BIG-MAP**
- Optimization of electrolyte formulations through active learning algorithms

BASF SE - Ludwigshafen (01/2023 - 05/2023)
Research internship

- Data Driven Modelling of Electrochemical processes
- Implementation of time-series algorithm for cycling stability of batteries

Karlsruhe Institute of Technology (KIT) (04/2021 - 07/2021)
Teaching Assistant

- Responsible for the lecture *machine learning and data management for chemistry*

Ulm University - Neuro- and Media-Informatics Institute (12/2020 - 09/2022)
Research and Teaching Assistant

- Research & development of **Luna**, a feature visualization package for Tensorflow2 used in explainable AI (XAI)
- Responsible for the lectures of *Deep Learning for Graphics and Visualization* and *Computer-Vision I*

Ulm University - Mathematics Institute (09/2018 - 07/2021)
Tutor

- Assisting and tutoring of the lectures *Geometry, Analysis for Engineering and Computer Science, Applied discrete mathematics* and *Linear Algebra*

Ulm University - Experimental Physics / Biomechanics Institute (06/2017 - 02/2020)
Research and Teaching Assistant

- Responsible for the *Physics Praktika*
- Research in the design of a 'Lung-on-chip', Viscoelasticity of knee-joint tissue

EDUCATION

Karlsruhe Institute of Technology (KIT), Germany (01/2020 - Present)
PhD, Robotics and Automation Engineering
Thesis: *Electrolyte optimization for post Lithium batteries using sequential learning algorithms*

The University of Huddersfield, United Kingdom (09/2019 - 09/2021)
Master of Science, Artificial Intelligence 0.8 With Distinction - (With Distinction)
Thesis: *Outlier treatment and efficient synthetic data generation for heart failure prediction*

Ulm University, Germany (09/2018 - 06/2019)
Master of Science, Biophysics 1.9 - (Good)
Thesis: *Functionalizing of cantilever in AFM for Biophysical applications*

Ulm University, Germany (11/2016 - 06/2019)
Master of Science, Advanced Materials 1.6 - (Good)

Amirkabir University of Technology - Tehran Polytechnic, Iran (12/2012 - 12/2016)
Bachelor of Engineering, Biomedical/Medical Engineering 16.90/20 - (Good)
Thesis: *Synthesis and characterization of silver doped in HA-Akermanite nanocomposite*

📍 Neu-Ulm, Germany

📅 08 January 1994

✉ fuzhanrahmanian@gmail.com

☎ (+49) 176 650 86536

🌐 Fuzhan Rahmanian

🔄 Fuzhan R

📍 Fuzhan Rahmanian

SKILLS

Data Science

Data Management, Data Visualization, Data Wrangling, ETL, NLP and ML Pipelines, Statistics, Linear Algebra

Programming Languages

Python, R, Julia, Protégé, PDDL, C

Tools & Frameworks

Git, VSCode, Tensorflow, PyTorch, Scikit-Learn, Matplotlib, Plotly, Pandas, Numpy, SciPy, SQL

Machine Learning

Linear, Tree, Bayes, SVM, Ensemble, Regression, Clustering models, PCA, ICA, LDA, UMAP

Deep Learning

CNNs, RNNs, GANs, XAI

Deep Reinforcement Learning

Monte Carlo, Q-Learning and DQN

Web Development

HTML, CSS, JavaScript, FastApi, Flask

Experimental Skills

SEM, AFM, FLIM, EDX, cell culture

LANGUAGES

Persian	English	German
Native Speaker	Fluent	B2 proficiency

Arabic	Italian
Elementary	Elementary

PROJECTS

Modular and Autonomous Data Analysis Platform (MADAP)

(04/2022 - Present)

Research project

- Designed & implemented object-oriented & abstract application for analyzing & visualizing electrochemical datasets
- Deployed the application as a **python package** usable via GUI or CLI ([GitHub](#))

Hierarchical Experimental Laboratory Automation and Orchestration (HELAO)

(02/2020 - 08/2021)

Laboratory Automation Framework

- Developed a web-based asynchronous platform for integrating combinatorial synthesis, high-throughput characterization, automatic analysis, machine learning and data management
- Collaborative development using git and review processes
- Actively used in two laboratories in Ulm and Münster for running closed loop optimization on multiple instruments without human intervention ([GitHub](#))

Development of feature visualization using TensorFlow (Luna)

(11/2020 - 08/2022)

Research project

- Translation of the lucid package developed by OpenAI Microscope from TensorFlow 1 to 2 ([GitHub](#))
- Capable of analyzing any TensorFlow models and visualizing their neurons, channels, layers, and output layers

Outlier treatment and efficient synthetic data generation for heart failure prediction

(12/2020 - 08/2021)

Masterthesis

- Applied data mining and cleaning methods for outlier detection, dimensionality reduction and feature selection
- Performed data augmentation techniques including SMOTE, Adasyn and cGAN
- Built reliable ML algorithm with high recall value for medical decision-making support

EXTRACURRICULAR ACTIVITIES

Udacity Nanodegrees

AI programming with Python, Machine learning, Deep learning, Deep Reinforcement Learning

Data science (Bosch AI Talent accelerator scholarship)

- Disaster Response pipeline: ETL / ML pipeline and a deployed Flask WebApp
- Identification of customer segments: Data preprocessing, feature transformation and clustering
- Object detection in an urban environment: EDA, Transfer learning, Tf Object Detection API, augmentations

Coursera

Machine learning, Convolutional Neural Network, TensorFlow, Object-Oriented-Programming

Management Workshops

Project management course provided by Hector School of Engineering and Management, part of the MBA Program of KIT

AWARDS & CONFERENCES

The Chancellor's Prize for Outstanding achievement by a postgraduate student

(03/2022)

University of Huddersfield: Sir George Buckley (Chancellor)

The Departmental Prize for the Best Overall Performance on Postgraduate study in Computer Science

(03/2022)

The Departmental Prize for the Best Postgraduate Project in Computer Science

University of Huddersfield: School of Computing and Engineering

Presentation: "AI Accelerated Asynchronous Experimentation for Battery Materials Discovery"

(11/2021)

MRS Conference Boston

Presentation: "How can machine learning and autonomy accelerate chemistry?"

(09/2020)

Chemical Science Symposium

STIBET scholarship

(10/2018)

DAAD (German Academic Exchange Service)

Interview and published article by "Südwest Presse"

(01/2018)

Südwest Presse

Selected as Elite Student Rank (top 0.5 % of all University applicants)

(06/2012)

University Entrance Examination Committee in Mathematics and Physics

PUBLICATIONS

2023 - Conductivity experiments for electrolyte formulations and their automated analysis

Nature - Scientific Data

2022 - One-shot active learning for globally optimal battery electrolyte conductivity

Batteries & Supercaps

2022 - From materials discovery to system optimization by integrating combinatorial electrochemistry and data science

Current Opinion in Electrochemistry

2022 - Enabling Modular Autonomous Feedback-Loops in Materials Science through Hierarchical Experimental Laboratory Automation and Orchestration

Advanced Materials Interfaces

2021 - High-Throughput Experimentation and Computational Freeway Lanes for Accelerated Battery Electrolyte and Interface Development Research

Advanced Energy Materials

2021 The potential of scanning electrochemical probe microscopy and scanning droplet cells in battery research

Electrochemical Science Advanced

2021 - Data Management Plans: the Importance of Data Management in the BIG-MAP Project

Batteries & Supercaps

2016 - Synthesis and characterization of Silver-containing Sol-gel Derived Bioactive Glass Coating

Springer Journal

2015 - Nano biomaterials for bionic eye: Vision of the future

Elsevier

TEACHING EXPERIENCE

Karlsruhe Institute of Technology (KIT)

Institute of Physical Chemistry

- **Summer Semester 2021 - Tutor of Machine learning and Data management for chemistry.**
Lecturer 1: Jun. Prof. Dr. Helge Sören Stein: helge.stein@kit.edu
Lecturer 2: Prof. Dr. Marcus Elstner marcus.elstner@kit.edu
- **02.22-03.22, 06.22-07.22 - Assistant in Physical Chemistry Praktikum for beginners**
Supervisor: Priv. Doz. Dr. Detlef Nattland (Akad. Oberrat) detlef.nattland@kit.edu

Ulm University

Institute of Neural Information Processing

- **Summer Semester 2021 - Tutor of Computer Vision**
Lecturer: Prof. Dr. Heiko Neumann heiko.neumann@uni-ulm.de

Institute of Media Informatics

- **Winter Semester 2020/2021 - Tutor of Deep Learning for Graphics and Visualisation**
Lecturer: Prof. Dr. Timo Ropinski timo.ropinski@uni-ulm.de

SK Mathematik

- **Summer Semester 2020 - Corrector of Geometry**
Lecturer: Prof. Dr. Jan-Willem Liebezeit jan-willem.liebezeit@uni-ulm.de
- **Summer Semester 2020 - Corrector of Analysis for Engineering and Computer Science**
Lecturer: Prof. Dr. Manfred Sauter manfred.sauter@uni-ulm.de
- **Winter Semester 2018/2019 Corrector of applied discrete mathematics**
Lecturer: Dr. Stefan Ehard stefan.ehard@uni-ulm.de