



Dr. Ing. Fuzhan Rahamanian

WORK EXPERIENCE

Technical University of Munich (TUM)

(01/2024 - Present)

Research Assistant

- Led an international collaboration of laboratory automation integrating AI-planners, data analysis, management, and hardware orchestration.
- Supervision of numerous involved parties and budget requirements and successful contribution to financial grants application.
- Managed platform development, quality assessment, and deliverable coordination for BIG-MAP work packages.

Karlsruhe Institute of Technology (KIT)

(01/2020 - 12/2023)

PoLiS Cluster of Excellence

PhD Candidate

- Coordination and Planning of Inter-Academic Projects for the Development of a web-based asynchronous material acceleration platform as part of **BIG-MAP**
- Successfully lead the optimization of electrolyte formulations through active learning algorithms between Forschungszentrum Jülich and KIT

BASF SE - Ludwigshafen

(01/2023 - 05/2023)

Research internship

- Plan, lead, and deployment of an interdisciplinary project between department of Digitalization and Battery that substantially reduced battery testing time and material costs in 6 months.
- Coordinated constructive collaboration and open dialog between the involved industrial and academic parties.
- Pipeline development data driven modelling and AI-aided solution for electrochemical processes.

Ulm University - Experimental Physics / Biomechanics Institute

(06/2017 - 02/2020)

Research and Teaching Assistant

- Responsible for the *Physics Praktika* and supervision of 30 students

EDUCATION

Technische Universität München (TUM)

(08/2023 - 06/2024)

PhD, Data Science and Digitalization

Summa Cum Laude - 1.0*

Dissertation: *Design and Implementation of Enablers in Materials Acceleration Platforms for Battery Research*

Karlsruhe Institute of Technology (KIT), Germany

(01/2020 - 07/2023)

PhD, Robotics and Automation Engineering

The University of Huddersfield, United Kingdom

(09/2019 - 09/2021)

Master of Science, Artificial Intelligence

0.8 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

LANGUAGES

Persian English

Native Speaker Fluent

German Arabic

B2, acquiring C1 Elementary

Italian

Elementary

PROJECTS

Autonomous millimeter scale high throughput battery research system (Auto-MISCHBARES)

(11/2022 - 12/2023)

AI Research Project

- Took the lead on the development of the AI strategy, Data governance, scientific publication and review. Coordinated and the strategic planning between interdisciplinary collaborators.
- Developed a transparent AI solution through a web-based asynchronous platform for integrating combinatorial synthesis, high-throughput characterization, quality control assessment, automatic analysis, machine learning and data management
- Design of a user-friendly, reactive Web Interface for experimental definition ([GitHub](#))

Attention-based ReCurrent Algorithm for Neural Analysis (ARCANA)

(01/2023 - 08/2023)

Collaborative Industrial AI Project

- Design and implementation of a time-series algorithm for the estimation of the state of health prediction of battery materials and evaluation of their cycling stability. ([Python Package](#))
- Development, optimization and training of the model on big data samples using high-performance computing infrastructure (curiosity supercomputer) @BASF ([GitHub](#))
- Delivered measurable time savings for different stakeholders

Modular and Autonomous Data Analysis Platform (MADAP)

(04/2022 - 12/2022)

Research project

- Lead an outcome-driven solution for electrochemical application across an interdisciplinary team located in Aachen, Münster, and Ulm
- 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)

Internationally applied Laboratory Automation Framework

- Team leadership and project management of the platform development for battery research between KIT and CalTech
- 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)

XAI Research project

- Translation of the lucid package developed by OpenAI Microscope from TensorFlow 1 to 2 ([GitHub](#))
- Capable of analyzing any Deep Learning TensorFlow-based 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 generative models (cGAN)
- Built reliable ML algorithm with high recall value for medical decision-making support

AWARDS

BIG-MAP PhD Award - Exceptional scientific contribution and leading role in the BIG-MAP project

(10/2023)

Battery Interface Genome - Materials Acceleration Platform

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

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

(03/2022)

University of Huddersfield: Sir George Buckley (Chancellor)

STIBET scholarship

(10/2018)

DAAD (Deutschen Akademischen Austauschdienstes)

Interview and published article by Südwest Presse"

(01/2018)

Ulm und Neu Ulm: „Ich erwarte sehr viel von mir“

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

(06/2012)

University Entrance Examination Committee in Mathematics and Physics

EXTRACURRICULAR CERTIFICATIONS

Udacity Nanodegrees	(07/2019 - 02/2020)
AI programming with Python, Machine learning, Deep learning, Deep Reinforcement Learning	
Data science (Bosch AI Talent accelerator scholarship)	(06/2022 - 11/2022)
• 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	(08/2020 - 10/2020)
Machine learning, Convolutional Neural Network, TensorFlow, Object-Oriented-Programming	
Management Workshop	(10/2020 - 11/2020)
Project management course provided by Hector School of Engineering and Management, part of the MBA Program of KIT	

PUBLICATION HIGHLIGHTS

- 2024 - Attention towards chemistry agnostic and explainable battery lifetime prediction**
Nature - npj Computational Materials
- 2024 - Autonomous millimeter scale high throughput battery research system**
RSC - Digital Discovery
- 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 - Enabling Modular Autonomous Feedback-Loops in Materials Science through Hierarchical Experimental Laboratory Automation and Orchestration**
Advanced Materials Interfaces

CONFERENCES

- Presentation "Workflows and orchestration in Self Driving Laboratories, Machine Learning" - INT workshop** (02/2024)
Artificial Intelligence for Materials Science, Department of Informatics, Karlsruhe Institute of Technology (KIT)
- Presentation "Elements for Materials Acceleration Platforms" - BIG-MAP EUified Battery Data Space Workshop** (01/2024)
BIG-MAP - European Union's Horizon 2020, Grindelwald, Switzerland
- Presentation "Autonomous millimeter scale high throughput battery research system (Auto-MISCHBARES)"** (06/2023)
eMRS Conference Strasbourg, RSC Conference Dublin
- 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

TEACHING EXPERIENCE

Karlsruhe Institute of Technology (KIT)

Tutor of Machine learning and Data management for chemistry, Assistant in Physical Chemistry
Praktikum for beginners

Ulm University

Tutor of Computer Vision, Tutor of Deep Learning for Graphics and Visualisation Corrector of Geometry,
Corrector of Analysis for Engineering and Computer Science, Corrector of applied discrete mathematics