Sara J. Al-Rawi

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Sara Al-Rawi – Solutions Architect

WORK EXPERIENCE

March 2023–Present

Solution Architect - Full-time Position

Cordes und Graefe KG , Bremen - Germany

- Design a Master Data System leveraging Azure Databricks, integrating multiple data sources.
- Lead the development of secure, scalable ETL pipelines for data ingestion, transformation, and storage.
- Develop and expose REST APIs to enable secure and efficient data access across platforms using FASTAPI/Pydantic.
- Provide technical leadership in cloud-based data solutions, big data processing, and security information systems.
- Implementation of CI/CD pipeline using GitHub Actions/Iac(Terraform).
- Performed business analysis including requirements gathering, gap analysis, and process mapping to develop new solutions and enhance successfully modernizing 3 legacy systems.

August 2024–Feb 2025

Professional Activities during Career Break

- Academic Supervision: Supervised a Bachelor thesis titled ”Analyzing Cyclists’ Behavior in Different Scenarios” using the
  CTV (Cyclist Top-View) dataset. Guided the student in data processing, behavior analysis, and trajectory visualization techniques.
- Freelance Data Architect: Designed and implemented data pipelines and analytical solutions using Azure Databricks. Built ETL workflows, defined data models, and developed scalable architectures tailored to client needs.
- Personal Responsibility: Provided full-time care for a close family member undergoing cancer treatment, demonstrating resilience, time management, and emotional strength.

January 2021– August 2024

Data Scientist/Research Associate in Knowledge Discovery and Synthesis supervised by Prof. Dr. Harald Binder

Institute of Medical Biometry and Statistics, Faculty of Medicine and Medical Center – University of Freiburg - Germany

- Developed and deployed Deep Generative Models (e.g., VAEs) for multiomics data integration and single-cell RNA sequencing analysis including ETL processes using Python/Pytorch and Julia.
- Designed browser-based training solutions using WebAssembly, democratizing AI accessibility.
- Contributed to the open-source Julia package for RNA sequencing analysis.
- Deep learning pipelines were created for synthetic biomedical image generation.
- Enhanced research reproducibility with Shinylive apps and explainable AI methods.
- Supervised master and bachelor students.

May 2019–September 2020

Data Scientist - Part-time Position

Psiori GmbH, Freiburg - Germany

- Improved image data pipelines through preprocessing and custom model adaptations ETL processes using Keras/Azure ML.
- Deployed optimized models on Azure Cloud for low-resource devices.

Key Achievement:

- Adapted Single Shot MultiBox Detector (SSD) for constrained hardware environments.

March 2015–December 2018

Software Engineer - Full-time Position

Printus GmbH, Offenburg - Germany

- Development and Deployment: user management modules, and payment process using Java.
- Automated Testing System: design and implementation of an automated testing system using Java for both backend and frontend components, improve test coverage and reduce manual testing effort.
- Operated within Agile environments to ensure efficient project delivery.

Key Achievement:

- Integrated various payment methods such as PayPal, SofortÜberweisung and VISA into ten online shops of Printus GmbH.
- Implemented and maintained a Test System.
- Maintained the CI/CD pipeline(DevOps).

September 2013–March 2014

Internship - Full-time Position

Bosch Engineering GmbH, Abstatt - Germany

- Design and implementation of a web-based solution for the financial department that replaces the usage of spreadsheets.
- Technical documentation.
- Operated within Agile environments to ensure efficient project delivery.

March 2014–October 2014

Master Thesis Student - Full-time Position

Bosch Engineering GmbH, Abstatt - Germany

- Design and implementation of a relational database.
- Design and implementation of the backend of the web application using Java.
- Implementation of the frontend of the web application using JavaScript/CSS
- Implementation of test automation.
- Technical documentation.
- Operated within Agile environments to ensure efficient project delivery.

July 2013–August 2013

Working Student - Part-time Position

University for Applied Sciences Offenburg, Offenburg - Germany

- Implementation of web-based solutions using PHP/JavaScript.

October 2010–October 2012

IT Support - Full-time Position

Embassy of Iraq, Muscat - Oman

- Monitoring the system and network.
- Written/oral support for the embassy staff.

EDUCATION

2018–2021

Msc. Computer Science

Faculty of Engineering, University of Freiburg

Master's Thesis: Sound Event Localization and Detection for Mobile Robots at Autonomous Intelligent Systems under the supervision of Prof. Dr. Wolfram Burgard

We studied sound event localization and detection for polyphonic sound (SELD) as a perceptual alternative in case of the absence of visual perception. We present two novel multi-tasking neural network architectures variants for SELD problem: visual attention-based parameter sharing and squeeze-and-excitation-based parameter sharing; for localizing and classifying sound events. The proposed networks learn the sound's features from multi-channel spectrograms of overlapping real-life sound events.

Program Focus:

- Technical Cognitive Systems. Courses: Robot Mapping, Machine Learning, Deep Learning, Statistical Pattern Recognition, Deep Learning Lab - Computer Vision Track
- Application Area: Bioinformatics and Life Science

2012–2014 **Msc. Communication and Media Engineering**

Faculty of Electrical Engineering, Medical Technology and Computer Science, University for Applied Sciences Offenburg

Master's Thesis: Master's Thesis: Developing a Concept and a Web Application for Processing and Analysis of Time-Delayed Resulting Internal Accounting Positions under the supervision of Prof. Dr. Klaus Dorer

Programm's Focus:

- Digital and Mobile Communication
- Interactive Distributed Applications
- Signal and System Theory
- Management Skills

2006–2010 **B.Eng. Computer Engineering and Information Science**

Faculty of Engineering, Syrian International Private University for Science and Technology, Damascus - Syria

- Algorithms, Mathematics, Smart Search Algorithms, Artificial Intelligence
- Network Applications Programming, Telecommunications, Computer Architecture

Certifications

Certified

- Azure Data Scientist Associate
- Agile Requirements Engineer

SKILLS

Languages

- English: Mother Tongue
- German: Fluent

Technical and Personal skills

Programming Languages & Frameworks

- Proficient in the following frameworks: single-cell variational inference tools, AnnData package, scbi package, and Multigrate
- Proficient in data engineering tool: (Azure) Databricks, FASTAPI.
- Proficient in machine frameworks: Pytorch, Scikit Learn.
- Proficient in techniques: fine-tuning, transfer learning
- Proficient in: Python, Julia, Java, Docker Container, Logging Tool: Weights & Biases AI platform/MLflow.
- Data Management: SQL, Oracle RDMS.
- Deployment: CI/CD Pipelines, IaC Terraform, Web-based AI Deployments (Shiny, Shinylive), C++/WebAssembly.
- Hands-on experience with transformer-based models (e.g., GPT, BERT), embeddings, RAG pipelines, and prompt engineering using LangChain/HuggingFace
- GGML: library for machine learning to enable large language models and high performance on commodity hardware.
- First hands-on experience with Agentic AI.

Selected Talks and Workshops

Lecturer and Tutor AGYA Summer School on Affordable Artificial Intelligence 2024
The Summer School on Affordable AI SAAI is a project of the AGYA working group Innovation in close collaboration with the AGYA working group Health and Society. The Arab-German Young Academy of Sciences and Humanities (AGYA) is funded by the German Federal Ministry of Education and Research (BMBF) and various Arab and German cooperation partners.

Presenter Deploying interactive deep learning: A case study in the context of research data management in 68. GMDS-Jahrestagung Conference 2023
This work is a step towards democratizing deep learning by enabling its deployment in web browsers. It removes the need for complex technical configurations to make deep learning more accessible to a broader scientific audience that does not possess technical expertise. It further enhances data protection and privacy by sidestepping the dependency on cloud-based solutions for privacy-sensitive data, e.g., patients' data.

Presenter Interpretable and Accessible Deep Learning for Single Cell Data Analysis Workshop in German Conference on Bioinformatics 2022
The workshop explored the application of Deep Generative Models, such as Variational Autoencoders, to learn low-dimensional representations. Additionally, it focused on utilizing explainable techniques, like Integrated Gradients, in deep learning to derive meaningful biological insights from the data.

Attendee AutoML Fall School 2021
The school covered core topics of AutoML, covering basics, state-of-the-art approaches and hands-on sessions. The school is organized by members of Ludwig-Maximilian-Universität München, Albert-Ludwigs-Universität Freiburg and Leibniz Universität Hannover.

Attendee International Interdisciplinary Computational Cognitive Science Spring School 2019
The spring school covered computational approaches in the brain and cognitive sciences, including both theoretical models and practical signal processing techniques.

References

Prof. Dr. Harald Binder
Head of the Institute of Medical Biometry and Statistics
Institute of Medical Biometry and Statistics (IMBI), Faculty of Medicine and Medical Center, University of Freiburg

Dr. rer nat Clemens Kreutz
Director Non-Clinical Statistics
Novartis AG, Basel, Switzerland