AHMAD REZAEI

Advances in AI Research and Explainable Deep Learning Solutions

in **LinkedIn** ⊙ **Github** % **Website** % **Google Scholar** ⓘ **0000-0002-9232-6934**
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PROFESSIONAL EXPERIENCE

Full-time Research Associate
Faculty of Computer Science and Automation, Technische Universität Ilmenau

📅 12.2021 - 03.2024   📍 Ilmenau, Germany

- Research on optical inspection of printed circuit boards (PCBs) aiming to explain AI predictions of PCB defects using deep learning (DL).
- Development of approaches for the global selection of explainable models.
- A total of 3 publications at ISI conferences.

Research Associate
Reliable & Smart Systems Lab.

📅 01.2019 - 07.2021   📍 Kerman, Iran

- Research on applied machine learning (ML) in bioinformatics.
- Conducted research on hardware design and deep learning accelerators.
- A total of 1 ISI journal publication, 1 Arxiv paper.

EDUCATION

MSc, Research in Computer and Systems Engineering
Technische Universität Ilmenau

📅 09.2020 - (11.2024)   📍 Ilmenau, Germany
- Grade: 1.54[1]

BSc, Electrical Engineering - Electronics
Shahid Bahonar University

📅 09.2014 - 09.2019   📍 Kerman, Iran
- Grade: 15.14/20

INVOLVED PROJECTS

Explainable Cognitive Optical Inspection in Electronics Manufacturing
TAB Project

📅 2021 - 2023   📍 Ilmenau, Germany

* Additional academic projects[2] on my **personal website**

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[1]Current grade excluding the thesis (as stated in M.Sc. transcripts)
[2]https://ahmadr75.github.io/

RESEARCH INTERESTS

Machine Learning, Explainable AI, Autonomous Driving, Digital Design

RELEVANT EXPERIENCE

Selected M.Sc. Projects

Sensor data fusion for decision prediction of pedestrians (autonomous driving) | Imblearn, Dlib

📅 11.2022 - 07.2023   📍 Group Studies Project

Implementation of CAN-bus Protocol on Two Arduino-Uno Devices | C++

📅 04.2022 – 07.2022   📍 Embedded Systems Lab.

Feature Processing and Time-Series Energy Prediction on Wafer Production Facility | Pandas, Tensorflow 2

📅 04.2022 – 07.2022   📍 Database Laboratory

Enhancement of Tiny Defect Detection through Modified YOLO for Tiny Objects | YOLOv5, Wandb

📅 12.2021 – 02.2022   📍 Research Project

Regularization Techniques against Image Reconstruction | Pytorch, Sklearn, Skimage

📅 06.2021 – 07.2021   📍 Deep Learning Course

COVID-19 Analysis of UK Government and Health Institutions on Twitter | Pandas, Datetime, Tweepy

📅 04.2021 – 09.2021   📍 Data Science Seminar

Research

Explainable Training: Training CNNs with Explanations as Feedback | tf.Graph, tf.Data

📅 01.2023 - 03.2024

- Using explanations to improve localization in CNN models.

ApplyCam: Interactive Explainable Software for Image Modification | PyQt5-tools, Docker

📅 07.2022

- Software for Windows and Linux that allows image settings adjustments and provides explanations through a deep learning model.

PUBLICATIONS

Rezaei, A., Nau, J., Streitferdt, D., Schambach, J., & Vangelov, T. (2023, October). *ReProInspect: Framework for Reproducible Defect Datasets for Improved AOI of PCBAs.* In 8th International Conference on Engineering of Computer-based Systems (ECBS), Västeras, Sweden (pp. 205-214). Cham: Springer Nature Switzerland.

Rezaei, A., Nau, J., Richter, J., Streitferdt, D., & Schambach, J. (2023, June). *FACEE: Framework for Automating CNN Explainability Evaluation*. In 2023 IEEE 47th Annual Computers, Software, and Applications Conference (COMPSAC), Torino, Italy, (pp. 67-78). IEEE.

Rezaei, A., Richter, J., Nau, J., Streitferdt, D., & Kirchhoff, M. (2023, February). *Transparency and Traceability for AI-Based Defect Detection in PCB Production*. In Modelling and Development of Intelligent Systems: 8th International Conference, MDIS 2022, Sibiu, Romania, October 28–30, 2022, Revised Selected Papers (pp. 54-72). Cham: Springer Nature Switzerland.

Rezaei, A., Taheri, M., Mahani, A., & Magierowski, S. (2023). *LRDB: LSTM Raw data DNA Base-caller based on long-short term models in an active learning environment*. arXiv preprint arXiv:2303.08915.

Rezaei, A., Mahani, A. (2021). *Noise-based logic locking scheme against signal probability skew analysis.* IET Computers & Digital Techniques, Wiley Online Library.

AWARDS

Generative AI with Large Language Models
Certificate of successful completion; overall grade achieved: 91.75%

📅 06.2024   📍 **Coursera, DeepLearning.AI**

C++ Programming Course
Certificate of successful completion of the course "Beginning C++ Programming-From Beginner to Beyond"

📅 04.2020   📍 Course by Frank J. Mitropoulos

VLSI CAD Part I: Logic
Certificate of successful completion; overall grade achieved: 81.03%

📅 06.2021   📍 **Coursera**

Xilinx Vivado HLS Course
Certificate of successful completion of the course "FPGA Design with High Level Synthesis Tool (Vivado HLS)"

📅 02.2020   📍 Course by Digitronix Nepal

Top 7 qualified for the second round of the Synopsys Olympiad
13th Synopsys Microelectronics Olympiad in Iran

📅 09.2018

Implementation and Evaluation of Explanation Methods for CNNs | Tensorflow 2

📅 03.2022 – 07.2022

- Selection and implementation of understandable explanation methods for end-users with performance evaluation of the model.

Optimization of DNA sensor data with Mauler ML network on Kintex-7 FPGA device | C++, Vivado HLS

📅 11.2020 - 07.2021

- Improving energy consumption and efficiency through software and hardware techniques such as quantization and pipelining.

Co-Supervisor
Student Research Assistant

📅 01.2023-06.2023

- Development of models for continuous learning for DL.

2 Research Projects for M.Sc.

📅 05.2022-04.2023, 09.2023-03.2024

- Title: "Methods and Techniques of Class Imbalance Learning in Deep Learning".
- Title: "3D Simulation of Fluids and Their Interaction with Objects".

SKILLS

Python   C++/C   MATLAB

AWS Sagemaker   TensorFlow 1&2, Keras
PyTorch   PyQt5   Git Version Control
Scikit, Matplotlib, NumPy   Pandas, HDFS, Oracle

Blender Plugin Development
Fluid Simulation

Xilinx Vivado Design Suite, ChipScope
Design Compiler   Cadencee SoC Encounter
Modelsim   Espresso Logic Minimizer
H-Spice

LANGUAGES

English - C1   German - C1
Persian - Native