



Mahmoud El Minawi

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Education

M.Sc in Electrical Engineering and Information Technology (Area of Focus: ML & Robotics) Zurich, CH
ETH Zurich Sep 2023- (exp. 2025)

Relevant Coursework: Software Engineering, Image Analysis and Computer Vision, Mathematical Optimization, Machine Learning, Optimal/Model Predictive Control, Big Data

B.Sc in Electrical Engineering and Information Technology Munich, DE
TUM (Technical University of Munich) Oct 2020 – Jul 2023

Grade: 1,8 (German grading system) (**top 15%**)

Thesis Title: “Modeling autonomous vehicles in microsimulations”

Relevant Coursework: Software Engineering Lab, Python for Engineering Data Analysis and ML, Fundamentals of AI, Algorithms and Data Structures

Deutsche Evangelische Oberschule Kairo Cairo, EG
German **Abitur** with a grade of 1.7 (German grading system) June 2020

Technical Skills

- Python, C++
- Object Oriented Programming ([Certificate](#))
- Deep Learning (PyTorch)
- ROS, Git
- SQL, Spark
- Numpy, Scipy, Pandas

Experience

Systems Engineering Intern Zug, CH
Roche Diagnostics Sep 2024 - Present

- Conducting in-depth data analysis to develop models for system reliability, focusing on hardware-software integration for the Blood Gas Analyzer Instrument.
- Automating data transfer between software platforms to achieve synchronized data flow, eliminating manual intervention, improving data consistency, and enhancing data accessibility.
- Contributing to the robotics team on automation scripts for Universal Robot Arm to automate manual processes, including Computer vision detection tasks.
- Skills developed:** Python, SQL, System architecture, technical decision-making, Test automation

Machine Learning / Robotics Research Intern Zurich, CH
ForzaETH Feb 2024 - Jun 2024

- Developed a deep learning algorithm for real-time opponent vehicle trajectory prediction in the context of autonomous racing
- Created an end-to-end ML pipeline for data collection, processing, and model tuning to enhance model relevance and response time.
- Worked with neural network deployment for time-series prediction in constrained environments (CNN, TCN, LSTM)
- Optimized real-time model inference, **achieving a 25% reduction** in processing time for enhanced performance
- Skills developed:** Python, Deep learning, Git, ROS

Autonomous driving software developer Munich, DE
IAV (Ingenieurgesellschaft Auto und Verkehr) Nov 2022 – Jul 2023

- Contributed to the autonomous driving automation team to enhance software processes
- Developed software code to automate the debugging process of control units of automotive vehicles
- Increased operational efficiency **by 30% by automating software** debugging processes for control units
- Skills developed:** Python, Software development

Robotics Intern

Chair of Automatic Control Engineering TUM

Munich, DE

Aug 2022 – Nov 2022

- Developed and implemented computer vision and control algorithms for a 6-DoF robotic arm (Comau Racer 5) to perform precise movements based on real-time sensor data.
- Created an algorithm to accurately detect and localize screw positions, enabling autonomous unscrewing and disassembly of household components.
- Integrated perception and manipulation techniques into an end-to-end system for robotic disassembly.
- **Skills developed:** Python, ROS, Robotics, Computer vision, Git, OpenCV

Battery Management Systems Engineer

WARR Rocketry

Munich, DE

Nov 2021 – Aug 2022

- Designed the PCB for the power supply of a rocket in a team
- In charge of Battery Management System
- **Skills developed:** Communication, PCB design, power distribution

Student Projects & Certificates

Software Engineering Project: [UNO Repo](#)

Sep 2023 - Dec 2023

- Created a UNO card game with a client-server-based network in a team of 5
- Integrated software testing methodologies throughout the development process
- Integrated an interactive GUI for enhanced gameplay experience
- **Skills developed:** C++, Gitlab, Client-server Communication

Computer Vision Projects: [Repository](#)

Sep 2022 - Jan 2023

- **Stereo 3D Reconstruction:** Designed a stereo vision system that reconstructed 3D coordinates from dual camera views, creating depth maps and 3D point clouds.
Skills: 3D reconstruction, camera calibration, NCC, Python
- **Image Classification Using CNN:** Built a CNN achieving 70% accuracy for image classification across six categories using PyTorch with data augmentation and batch normalization.
Skills: CNN, deep learning, PyTorch
- **Image Compression for Tic-Tac-Toe Transmission:** Developed a PCA-based algorithm to compress noisy game images from a low-res camera, optimizing transmission and reconstructing clean images client-side.
Skills: PCA, image processing, Python

Leadership

Teacher Assistant

Chair of Physics of Electrotechnology TUM

Munich, DE

Apr 2022 – Aug 2022 & Apr 2023 – Aug 2023

- Provided academic support and guidance to fellow students, helping them understand course material
- Took on this role **twice**, Course: Electricity and Magnetism

Languages & Interests

- **English:** fluent
- **German:** fluent
- **Arabic:** fluent
- **French:** sufficient knowledge

Interests: ML, Robotics, Computer-Vision, Software Engineering, Autonomous Systems

Non-technical interests: Waterpolo (3x National Champion), Volleyball