Seif Shams

Robotics Software & Automation Engineer

Munich, Germany | seif.shams6655@gmail.com | +49 178 8199827

LinkedIn | GitHub

Professional Summary

Full-stack software engineer building applications that help people operate, monitor, and maintain robots. Experience spans React interfaces, backend APIs, PostgreSQL databases, WebRTC camera streaming, and containerized deployment. Developed an end-to-end digital twin platform at Fraunhofer IWU and deployed diagnostics and teleoperation tools at NEURA Robotics, including a system enabling one-person robot-cell operation. Seeking a full-time software engineering role.

Professional Experience

NEURA Robotics Sep 2026 – Present

Teleoperation Intern – Robotics Software Development

Munich / Freising, Germany

- Developed and deployed a **multi-robot diagnostics application** consolidating network readings, ROS topic activity, Docker container logs, and hardware status, helping teams trace failures and identify affected robot components.
- Designed and deployed a **React/Electron teleoperation application** combining USB foot-pedal controls, Xsens motion-capture automation, guided start/stop sequences, and spoken feedback, enabling a single teleoperator to operate the robot cell without an additional assistant.
- Separated the teleoperation interface from backend commands and Windows hardware/automation helpers, integrating configurable controls, live status, and event logging to support operation and troubleshooting.
- Built a **maintenance application for service teams** automating Docker container installation, robot software updates, and display configuration through a graphical interface, replacing manual SSH commands with guided workflows and status checks.
- Investigated robot software bugs and implemented **camera recovery workflows** using connection checks, automated container restarts, and frame-rate verification to restore camera operation after failures.

Fraunhofer IWU Mar 2025 – Aug 2026

Student Research Assistant – Robotics Software Engineering

Chemnitz, Germany

DynaRisk – Digital Twin & Robot Simulation Platform

- Developed the platform **end to end**, connecting a React/Three.js interface with Node.js/Express APIs, PostgreSQL/Prisma persistence, and Docker/Nginx deployment infrastructure.
- Developed **backend APIs and interactive 3-D tools** for configuring robot workcells, visualizing joint states, and executing trajectories, connecting simulation workflows with persistent project data.
- Built workflows for creating and saving virtual workcells, configuring URDF-based multi-robot systems, and reviewing simulation results; integrated robot and human trajectories, inverse kinematics, TCP tools, and telemetry visualization.
- Implemented robot–human collision monitoring at approximately **30 Hz**, with contact-point and escape-path analysis and repeatable trajectory tests.
- Added JWT authentication, role-based access, protected APIs, health checks, structured logging, Prometheus metrics, and persistent test results to support system operation and troubleshooting.

Adaptive Robotic Palletizing – Perception & Online Planning

- Developed an **adaptive palletizing pipeline** for unfamiliar boxes without predefined object models or per-object retraining, connecting RGB-D perception, online 3-D bin-packing, and robot-control workflows.
- Combined **SAM2 prompt-based segmentation** with Intel RealSense depth data to extract 3-D coordinates of operator-selected objects, supporting picking decisions from the observed scene rather than fixed object positions.
- Built a **web operator interface with WebRTC camera streaming**, interactive object selection, and segmentation-mask review and saving, allowing users to introduce new objects without changing the perception code.
- Integrated guided ChArUco-based hand–eye calibration and an HTTP robot-control bridge to transform camera measurements into robot coordinates and connect perception and planning with robot execution.

Technical University of Munich (TUM) – fml Oct 2023 – Oct 2024
Research & Development Intern & Bachelor's Thesis Student
Munich, Germany

- Migrated a logistics tugger-train AGV from **ROS 1 to ROS 2**, integrating navigation, robot interfaces, and monitoring, and validating behaviour through robot testing.
- Developed a **React operator interface** combining joystick teleoperation, click-to-navigate commands, automatic charging-station dispatch, live SLAM maps, and telemetry in one operating workflow.
- Conducted bachelor's thesis research comparing **AMCL, EKF, and Cartographer localization**; integrated wheel odometry and AMCL through EKF sensor fusion, achieving **7 mm localization accuracy** in the evaluated setup and a **73% RMSE reduction** versus standalone EKF.
- Integrated and validated an **Azure Kinect/OpenCV docking system** using ArUco charging-station detection and coordinate-frame integration, achieving **10 mm positioning accuracy** on hardware.

Projects

Autonomous Golf Cart – German International University Feb 2024 – Jul 2024
ROS 2 · VLP-16 LiDAR · GPS · Cartographer · EKF

- Contributed to converting an electric golf cart into an autonomous vehicle; implemented and tested outdoor navigation using Cartographer SLAM and LiDAR/GPS sensor fusion.
- Contributed to a motor-and-gear steering retrofit, calculating the steering gear ratio; used VLP-16 LiDAR for environmental perception and obstacle detection.

Autonomous Intersection Management – GIU 2023
TD3 Reinforcement Learning · ROS · TurtleBot3 · MATLAB/Simulink

- Built a two-TurtleBot3 simulation and trained a **TD3 reinforcement-learning controller** for intersection navigation using LiDAR relative-distance and robot-state inputs, while a second robot moved randomly.
- Implemented randomized starting positions and automated respawning to diversify training scenarios and evaluate behaviour across intersection configurations.

Technical Skills

Languages	Python, JavaScript, C++, C, SQL, HTML/CSS
Frontend & Desktop	React, Three.js, Electron, Vite, WebRTC
Backend & APIs	Node.js, Express, REST API design, gRPC, robot-control integration, JWT authentication, role-based access control
Databases & Infrastructure	PostgreSQL, Prisma, Docker, Nginx, Linux, Git, Prometheus, structured logging, health checks
Robotics & Integration	ROS 2, ROS 1, URDF, Gazebo, MoveIt, teleoperation, robot calibration, trajectory planning, inverse kinematics
Vision & Learning	OpenCV, SAM2, Intel RealSense, Azure Kinect, RGB-D perception, TD3 reinforcement learning, MATLAB/Simulink
Navigation	Nav2, SLAM, Cartographer, AMCL, EKF sensor fusion, LiDAR, GPS

Education

TU Chemnitz Oct 2024 – Expected Sep 2027
M.Sc. Embedded Systems | Chemnitz, Germany

German International University Sep 2020 – Jul 2024
B.Eng. Robotics and Automation | Giza, Egypt
Final grade: **2.0 (German scale)**

Languages

English – Fluent (C1) **German** – Intermediate (B1) **Arabic** – Native