Amro Moustafa

Senior Software Engineer — ADAS Validation & Systems Integration

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Professional Summary

Senior ADASAD systems and validation engineer with 4+ years of hands-on production experience in ISO 26262-compliant V&V, safety architecture, and test automation at CARIADVW Group. Designed and built production-grade toolchains from scratch: a single CARLA + Python + Docker + AWS + GitLab CI + Jira Xray pipeline that cut integration cycle time by **25%** across three VW platforms and delivered automated safety evidence per release. Deep expertise across the full validation stack — MiLSiLHIL, SOTIFISO 21448 scenario coverage, DOORS → Jira Xray traceability, ECU flashdiagnostics, CANEthernet analysis, and cloud infrastructure. AI integration in production: LLM-based requirements analysis + ML triage classifier reduced campaign defect triage from **20 min to 3 min** (7×). Technical lead on cross-functional CARIAD programme milestones; ISTQB® Certified Tester FL 4.0; Prototype Driving Licence (Germany).

Professional Experience

05/2023 – Present
Berlin, Germany

Professional Software Engineer — ADAS Systems Integration & Validation
EDAG Group, embedded at CARIAD / VW Group

- **End-to-end integration ownership:** served as technical anchor for ADAS validation programmes at CARIAD/VW Group — full pipeline from requirements decomposition through test execution, defect triage, and safety evidence delivery; direct accountability for system quality at milestone reviews.
- **Toolchain built from scratch:** designed and implemented a complete ADAS simulation and validation toolchain (CARLA 0.9.14, Python, Docker, AWS EC2 GPU) — automated scenario execution, KPI evaluation, PDF report generation, and Jira Xray REST API traceability updates in a single CI/CD pipeline. Result: **25% reduction** in test cycle time across three VW vehicle platforms; reused unchanged across all releases.
- **AI in production:** integrated LLM-based requirements ambiguity detection and ML failure-mode classifier into live validation pipelines — triage time reduced from **20 min to 3 min** per campaign; running in production, not a prototype.
- **ISO 26262 / SOTIF compliance:** designed SOTIF-aligned (ISO 21448) scenario coverage frameworks for AEB, LKA, and ACC — ODD parameterisation, systematic known/unknown scenario space mapping, adversarial parameter sweeps; maintained bidirectional DOORS → Jira Xray traceability from safety goals to test evidence; **zero untraced safety requirements** at every programme milestone.
- **HIL / SiL test systems:** designed closed-loop test sequences on HIL benches (dSPACE, Speedgoat); defined stimulus injection patterns, sensor model configurations, and validated system responses against ASIL-rated acceptance criteria; worked daily with CAN, LIN, and Ethernet — captured and analysed network traces with Vector tools and Wireshark; managed ECU flash workflows for software update validation.
- **Fleet-scale monitoring:** built CI/CD-integrated dashboards (GitLab, Python, Jira Xray) aggregating real-time test campaign health, KPI trends, and safety-relevant anomalies across multiple simultaneous software builds and release branches; automated alerting on safety-critical test failures replacing manual status meetings.
- **Cloud infrastructure:** deployed and managed AWS EC2 GPU fleets and Azure DevOps pipelines for distributed simulation campaigns; implemented MQTT/AWS IoT event-driven messaging between vehicle-side simulation agents and backend analytics.
- **Technical leadership:** led integration reviews bridging ADAS software, ECU hardware, network, and test infrastructure teams; presented findings at CARIAD programme reviews; mentored junior engineers; led sub-project modules independently.

09/2021 – 03/2023
Gifhorn, Germany

Function Developer / Application Engineer
IAV GmbH

- **Embedded systems modelling:** developed and validated Simulink models for vehicle air management ECU software — feedback control loops, transfer function characterisation, system identification from CAN-logged measurement data; validated model fidelity against vehicle signals.
- **AI for controller optimisation:** applied DDPG Reinforcement Learning to autonomously optimise PI controller parameters — defined state space, reward function, and convergence criteria; achieved **overshoot reduction from 15% to 4%** over 50,000 training steps; results validated statistically and presented to engineering leadership.
- **Measurement data tooling:** built Python pipelines for `.a2l`, `.hex` ECU calibration file processing using INCA; automated feature extraction, sensor deviation correction, and structured database population (MySQL, InfluxDB) for time-series vehicle data — zero manual steps after initial build.
- Created UML system diagrams for embedded software architecture documentation; maintained structured specification artefacts for cross-team traceability. Intern period: data-based prediction algorithm; database architecture (MySQL, InfluxDB); interface definition to existing data processing tools.

07/2018 – 04/2019
Stuttgart, Germany

Research Engineer — Simulation & Safety Analysis
Fraunhofer IPA

- Developed simulation tools for safety-zone modelling in human-robot collaboration — applied risk assessment thinking directly analogous to ODD definition and Minimal Risk Condition analysis in autonomous driving functional safety.
- Engineered a Java application to evaluate robot and sensor configurations against safety, cost, and automation potential criteria; designed SolidWorks models for mechanical components; produced manufacturing documentation to optimise production workflows and quality assurance.
- Collaborated with multidisciplinary teams on research and industrial automation projects integrating design, evaluation, and implementation phases.

2013 – 2014
Alexandria & Mansoura, Egypt

Automotive Diagnostics Trainee
BMW Group · Mercedes-Benz Egypt (MCV)

- **BMW Group (Feb–May 2014):** performed functional safety-system verification and ECU diagnostics on production-ready vehicles using OEM diagnostic platforms; interpreted fault codes and safety-relevant system behaviour; used automated test plans, sensor calibration, and EOL verification.
- **Mercedes-Benz Egypt (Aug–Sep 2013):** applied CAN/LIN OEM diagnostic tools for DTC reading, fault-finding, and ECU software flashing on commercial vehicles; observed update and flashing procedures for electronic control units.

Jul – Aug 2013
Cairo, Egypt

Trainee — Aircraft Electrical / Avionics
EgyptAir

- Gained hands-on exposure to aircraft electrical and avionics systems: power generation, distribution, cockpit indication systems, wiring inspections, and diagnostic procedures using ground test equipment and built-in test functions.

Key Achievements

- **25% integration cycle time reduction:** built complete ADAS validation toolchain (CARLA + Python + Docker + AWS + GitLab CI + Jira Xray) from scratch — single automated pipeline from ECU software ingestion to signed release QA evidence; reused across 3 consecutive VW vehicle platform releases without rework.
- **AI triage in production (7× faster):** LLM-based requirements analysis + ML failure classifier running live in integration pipelines — defect triage time reduced from 20 min to 3 min per campaign; enabled faster escalation and shorter release decision cycles.
- **Zero untraced safety requirements:** full DOORS → Jira Xray bidirectional traceability from safety goals through system requirements to test cases and validation evidence — maintained at every CARIAD/VW Group programme milestone; coverage matrix generation automated via Jira Xray REST API.
- **Fleet-scale integration health dashboards:** real-time CI/CD-integrated dashboards (GitLab + Python + Jira Xray) aggregating integration health, quality KPIs, and test campaign status across multiple simultaneous builds and release branches — automated alerting on quality-gate failures replaced manual status meetings.
- **SOTIF scenario coverage architecture (ISO 21448):** designed multi-dimensional ODD parameter spaces for AEB, LKA, and ACC with statistical coverage evidence — formal scenario coverage methodology enabling argument-complete safety cases for ADAS/AV integration validation at scale.

- **DDPG RL controller optimisation (IAV):** overshoot reduced from 15% to 4% over 50,000 training steps; formal convergence validation against CAN-logged vehicle measurement data; presented to IAV engineering leadership.

Selected Projects

ADAS Validation Toolchain

CARLA · Python · Docker · AWS · GitLab CI

Built a complete ADAS scenario validation toolchain from scratch at CARIAD/VW Group: CARLA 0.9.14 simulation engine, Python orchestration, Docker containerisation, AWS EC2 GPU fleet, GitLab CI pipeline, and Jira Xray REST API for automated safety evidence generation.

- **25% reduction** in test cycle time across 3 VW vehicle platforms
- Deployed unchanged across 3 consecutive software releases
- Automated KPI evaluation, PDF report generation, safety evidence upload to Jira Xray

AI-Accelerated Defect Triage

Python · LLM · ML Classifier · asammdf

Integrated LLM-based requirements ambiguity detection and ML failure-mode classification into the live ADAS validation pipeline at CARIAD. Automatically categorises defects, flags safety-critical failures, generates structured triage recommendations. Running in production.

- Triage time: **20 min** → **3 min** per campaign (7× faster)
- Processes multi-channel sensor measurement data at scale
- Safety-critical anomaly flagging integrated into release decision gates

ISO 26262 Safety Evidence Pipeline

ISO 26262 · SOTIF · DOORS · Jira Xray · Python REST API

End-to-end ISO 26262-compliant V&V workflows for AEB, LKA, ACC at CARIAD/VW Group. ASIL-rated test plans, coverage matrices, safety evidence reports; bidirectional DOORS → Jira Xray traceability; SOTIF ODD parameterisation with adversarial scenario sweeps.

- **Zero untraced** safety reqs at every milestone
- SOTIF adversarial ODD sweeps for AEB, LKA, ACC
- Automated coverage-matrix via Jira Xray REST API

DDPG RL — ECU Controller Optimisation

Python · DDPG · Reinforcement Learning · Simulink · CAN

Applied Deep Deterministic Policy Gradient RL to autonomously optimise PI controller parameters for vehicle air management ECU at IAV GmbH. Defined state space, reward function, and convergence criteria; validated against CAN-logged measurement data.

- Overshoot: **15%** → **4%** over 50,000 training steps (73% improvement)
- Formal convergence validation vs. CAN-logged vehicle data
- Presented formally to IAV engineering leadership

Fleet-Scale Integration Dashboards

Python · GitLab CI · Jira Xray · pandas · matplotlib

CI/CD-integrated monitoring dashboards for ADAS test campaign health at CARIAD/VW Group. Real-time KPI alerting for safety-critical anomalies integrated with GitLab CI and Jira Xray — full release-cycle visibility across multiple vehicle platforms in one view.

- Real-time safety-critical failure detection across platforms
- Automated anomaly alerts into release decision gates
- Dashboard updated on every GitLab CI pipeline execution

Tools & Technologies

Simulation & Test	CARLA 0.9.14, TPT, dSPACE, Speedgoat, MATLAB / Simulink, MiL / SiL / HIL
Automotive Bus	CAN, LIN, Ethernet / DoIP / ISOTP, CANoe, Vector tools, Wireshark, INCA
Requirements & ALM	DOORS, Jira, Jira Xray, Confluence, Jama, ASPICE
Programming	Python (Expert), C / C++ (Expert), MATLAB / Simulink (Expert), Java (Proficient), Bash (Proficient)
DevOps & Cloud	GitLab CI, Docker, AWS EC2 / IoT, Azure DevOps, MQTT, Git
AI / ML	LLM integration (production), DDPG RL, ML classifiers, TensorFlow, asammdf, pandas, matplotlib
Data & Databases	MySQL, InfluxDB, pandas, asammdf, time-series measurement data pipelines
CAD / Mechanical	SolidWorks (Expert), CATIA (Proficient), AutoCAD (Proficient)

Volunteering

Administrator	ASME Mansoura University Student Section	11/2012 – 07/2014
Team Leader, Blood Bank	Resala Charity Association, Egypt	03/2009 – 08/2017
Photographer	IEEE Egypt Section	11/2012 – 07/2014
Administrator	Lemasr Charity Association, Egypt	02/2011 – 08/2017

Education

Mechatronics and Robotics Engineering, M.Sc
Leibniz Universität Hannover
10/2020 – 03/2023
Hannover, Germany

Grade: 2.2 (gut)

Mechatronics / Mechanical Power Engineering, M.Eng
Hochschule Merseburg
10/2019 – 10/2020
Merseburg, Germany

Grade: 1.7 (sehr gut)

Mechanical Power Engineering, B.Sc
Mansoura University
09/2009 – 07/2014
Mansoura, Egypt

Grade: 2.3

Certifications

ISTQB® Certified Tester Foundation Level 4.0
iSQI Group | ID: 25-CTFL 4-264163-01
07/2025
Germany

Google Prompting Essentials
Coursera | Google
2025
Online

Claude Code Architect
Anthropic
In Progress
Online

Languages

Arabic	German	English
NATIVE	C1+ PROFESSIONAL	C1+ PROFESSIONAL

Hobbies

Traveling | Photography | Camping | Swimming

Core Technical Skills

ISO 26262 / FuSi	**ADAS / AD Validation**	**HIL / SiL / MiL**	**Test Architecture**	**CI / CD / DevOps**	**ML / LLM**
EXPERT	EXPERT	EXPERT	EXPERT	EXPERT	EXPERT
CAN / LIN / Eth	**ECU Diag. / Flash**	**SOTIF / ISO 21448**	**Failure Analysis**	**Tech. Leadership**	**Req. Traceability**
EXPERT	EXPERT	EXPERT	EXPERT	EXPERT	EXPERT

Programming

Python	Matlab / Simulink	C / C++	Java
EXPERT	EXPERT	EXPERT	PROFICIENT

Strengths

ISO 26262 | SOTIF / ISO 21448 | ASPICE | ADAS Validation | HIL / SiL / MiL | CARLA Simulation | CI / CD | Docker | GitLab | Python | Bash | LLM Integration | Jira / Jira Xray | DOORS | Test Automation | Root-Cause Analysis | HARA / FMEA | Team Leadership