

# Ahmed Hesham

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## PROFESSIONAL PROFILE

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AI/ML Engineer and Full-Stack Developer with production experience across deep learning, natural language processing, computer vision, and LLM integration. Proven ability to architect and ship end-to-end systems — from model training and REST APIs to cross-platform desktop applications and offline-first mobile POS platforms — on AWS-backed infrastructure. Adept at transforming complex domain problems into scalable, deployable products. Open to relocation and international roles.

## TECHNICAL SKILLS

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**AI & Machine Learning:** Deep Learning (CNN, RNN, U-Net, ResNet, Transformers), NLP, Computer Vision, LLMs & Prompt Engineering, Anomaly Detection, Predictive Modeling

**Frameworks & Libraries:** TensorFlow, Keras, PyTorch, Scikit-learn, OpenCV, Hugging Face, LangChain, LightGBM, XGBoost, Pandas, NumPy, Plotly

**Languages:** Python, TypeScript, JavaScript, Kotlin, Java, C#, C++, SQL

**Full-Stack & Backend:** FastAPI, Next.js 14, React, Node.js / Express, .NET / WPF, REST APIs, Kysely, SQLAlchemy, Alembic, Prisma, Zustand

**Mobile & Desktop:** Android (Kotlin, Jetpack Compose), PWA / Offline-first (IndexedDB, Dexie.js, Service Workers), JavaFX, Tauri, Electron, Windows Forms (.NET)

**Cloud & DevOps:** AWS (EC2, S3, Lambda, RDS, VPC, IAM, CloudWatch), Docker, GitHub Actions CI/CD, Nginx, Linux

**Databases & Tools:** PostgreSQL, SQLite, Redis — Git, Postman, Jupyter, VSCode

## EXPERIENCE

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### Data Engineer Intern

Jan – Jul 2025

ACCUR DIGITAL, Remote

- Trained a U-Net + ResNet34 corrosion segmentation model on 5,000+ images, achieving 90% validation accuracy with pixel-level masks and 5-level severity classification.
- Authored Python ETL pipelines processing over 1M log entries, cutting anomaly detection latency by 20%.
- Applied TF-IDF clustering to 10,000+ unstructured maintenance records, lifting scheduling-prediction accuracy by 25%.
- Delivered LightGBM/XGBoost failure-prediction models ( $R^2 > 0.85$ ) integrated into a live industrial analytics platform.

### Cloud Architect Intern

Aug – Sep 2025

National Telecommunication Institute (NTI), Remote

- Designed and secured scalable AWS environments using EC2, RDS, S3, Lambda, IAM, VPC, and CloudWatch, applying high-availability and cost-optimisation best practices.
- Completed certification-track training aligned with AWS Solutions Architect Associate competencies.

## SELECTED PROJECTS

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### Dukkan — Offline-First Local Business POS System — React · TypeScript · Node.js / Express · PostgreSQL · Dexie.js · Docker

- Production-ready, multi-tenant POS and operations platform targeting small businesses in Egypt and emerging markets; runs on low-end Android tablets with no internet dependency.
- Offline-first architecture: all transactions written to IndexedDB (Dexie v3) instantly, synced to PostgreSQL in the background with exponential backoff, dead-letter handling, and idempotent client UUIDs — zero data loss on flaky connections.
- Scope covers orders, inventory with profit-margin tracking, customer credit ledger (debit/payment cycle), returns and refunds with automatic stock restoration, printable invoices, and a KPI dashboard with real-time low-stock alerts and revenue comparison.
- Full Arabic (RTL, Cairo font) and English (LTR) internationalisation via i18next; language switch updates document direction without a page reload. Shipped as a PWA installable to mobile home screens.

### Vessel Guard — Engineering FFS SaaS Platform — Next.js 14 · FastAPI · PostgreSQL · Docker · AWS

- Full-stack platform for ASME B31.3/VIII and API 579 fitness-for-service calculations with real-time collaboration, PDF report generation, JWT/RBAC auth, Redis caching, and Celery async tasks.
- Monorepo architecture (Turborepo); containerised with Docker Compose; deployable to AWS ECS/Fargate or Azure Container Apps. Reduced manual engineering analysis time by 40%.

**Corrosion Annotator — Hybrid CV Segmentation System** — TensorFlow · U-Net · ResNet34 · OpenCV · CRF

- Ensemble segmentation combining deep learning pixel-wise masks with HSV classical vision, refined via CRF post-processing; outputs severity label, area ratio, and colour overlay per image.
- Reproducible batch-processing workflow applicable to pipeline, storage tank, and offshore infrastructure inspection.

**Email Security Backend — NLP Threat Detection API** — FastAPI · PostgreSQL · TF-IDF / LinearSVC · VirusTotal · Safe Browsing

- Multi-signal threat scorer: SPF/DKIM/DMARC header analysis, URL reputation checks, attachment hash lookup, and a calibrated NLP phishing classifier — auto-quarantines or deletes flagged messages.
- REST API with Prometheus metrics; token-bucket rate limiter for free-tier external APIs; deployed on Render/Railway with PostgreSQL.

**Customer Behaviour Prediction & Personalised Marketing** — Python · Scikit-learn · Random Forest · LightGBM · Plotly

- RFM-based segmentation paired with ensemble purchase-behaviour models (75–85% accuracy); auto-generates targeted email campaigns per segment. One-command pipeline from raw CSV to interactive HTML/PDF dashboard.

**Business Wise — AI Maintenance Analytics** — Python · XGBoost · Prophet · LangChain · OpenAI · spaCy

- Equipment failure forecasting with Isolation Forest and LOF anomaly detection, Prophet time-series analysis, and LLM-generated executive summaries. NLP entity extraction over work-order text; outputs Plotly dashboards and PDF reports.

**Zest — Multi-Restaurant Food Ordering Desktop App** — Java 17 · JavaFX · SQLite · Maven

- Full-featured desktop application with customer ordering, merchant dashboard, and real-time order-status tracking; MVC architecture with six design patterns (Singleton, Factory, Strategy, Adapter, Decorator, Snapshot).

**AutoCarePro — Vehicle Maintenance Management App** — C# · .NET Windows Forms · Entity Framework Core · SQLite

- Role-based desktop app (Car Owner / Maintenance Centre / Admin) with RBAC, SHA-256 auth, wizard-guided data entry, light/dark theming, audit trail, and automated schema migration.

## EDUCATION

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**B.Eng., Computer Engineering**

2023 – 2027 (Expected)

*Arab Academy for Science, Technology and Maritime Transport (AASTMT)* — Alexandria, Egypt

**Relevant Coursework:** Machine Learning · Deep Learning · Data Analytics · Data Security & Cryptography · Computer Networks · Database Systems · Data Structures & Algorithms · OOP · System Programming · Operations Research

## CERTIFICATIONS & ACHIEVEMENTS

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- Machine Learning Specialization — National Telecommunication Institute (NTI), 2024
- AWS Cloud Architecture Training (Solutions Architect Associate track) — NTI, 2025
- ECPC (Egyptian Collegiate Programming Contest) Participant, 2024
- National Champion, RoboCup Junior Egypt, 2019 · Asia-Pacific RoboCup Participant, 2018