Zoubair Mabrouk
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Computer Science Engineer :
Software and Data Engineering

PROFILE

I am a motivated and passionate computer engineering student specializing in Software Engineering and Data Intelligence, currently seeking a final-year internship (4 to 6 months) to apply my academic knowledge to a real-world professional project. I am available from the 1st February.

TECHNICAL SKILLS

- ✓ **Programming Languages**: JavaScript, TypeScript, Java, PHP, SQL, Python, C#, C, C++
- ✓ **Web Development**: React JS, Angular TS, Next JS, Node JS, Express JS, ASP.NET, Laravel, J2EE/Spring
- ✓ **Mobile Development**: Android Native (Java, Kotlin), Cross-Platform (Flutter, React Native)
- ✓ **Artificial Intelligence**: Search Algorithms (Dijkstra, Ford, A*), Machine Learning (K-means, SVM, Random Forest, XGBoost), Deep Learning (RNN, CNN, Transformers), Transfer Learning (BERT, T5, VGG16)
- ✓ **Data Science**: Data Quality, Data Engineering, Data Processing (NumPy, pandas, Matplotlib, seaborn, statistics)
- ✓ **AI Technologies**: TensorFlow, Keras, Torch, PyTorch, Scikit-learn, NLP (NLTK, Spacy)
- ✓ **Big Data**: Hadoop, HDFS, HBase, Hive, Spark
- ✓ **Business Intelligence**: ETL, SSIS, SSAS, Talend, Data Warehouse, OLAP Cubes, MDX, DAX, Power BI
- ✓ **Architectures**: N-Tier, MVC, UML, MDA, MDE, SOA, MVVM
- ✓ **Design Patterns**: Singleton, Factory, Decorator, Adapter, Observer, Strategy, etc.
- ✓ **Databases**: SQL Server, MySQL, PostgreSQL, MongoDB (NoSQL), Firebase
- ✓ **Operating Systems**: Linux, Windows
- ✓ **Cloud**: AWS, Microsoft Azure
- ✓ **Methodologies**: Agile, V-Model
- ✓ **DevOps**: Git/GitLab, CI/CD, Docker, Ubuntu, Kubernetes, Kanban, Ansible, Terraform, Monitoring
- ✓ **Tools / IDEs**: Maven, Gradle, XAMPP, Tomcat, Nginx, VS Code, IntelliJ, Visual Studio, Android SDK

LANGUAGES

- ✓ English: Fluent
- ✓ French: Fluent
- ✓ German: Beginner

EDUCATION

- ✓ **2026 (in progress) –** Engineering Degree in Computer Science, specialization in Software Engineering International Institute of Technology (IIT) – North American Private University, Sfax
- ✓ **2025 (in progress) –** Master's Degree in Data Mining Research Faculty of Economics and Management of Sfax (FSEGS)
- ✓ **2022 –** Bachelor's Degree in Computer Technology, specialization in Embedded Systems Higher Institute of Technological Studies of Sfax (ISETS)

PROFESSIONAL EXPERIENCE

ReDCAD Laboratory – National Engineering School of Sfax (ENIS)

📺 **January 2025 – Present**

Publications:

- ✓ Managing Model Evolution from NoSQL Data Lakes to Decision Support Systems **– MEDI Conference.**

- ✓ Integration of Heterogeneous Data Using AI Semantic Matching for Decision Support Systems Evolution **– TACC Conference.**

Context: Research Thesis – Intelligent Decision Systems Evolution and Semantic Data Integration

- ✓ Designed and developed an AI-augmented schema matching framework combining Model-Driven Engineering (MDE) and semantic intelligence to automate heterogeneous data model integration.

- ✓ Applied MDE principles to formalize and generate transformation rules between conceptual, logical, and physical data schemas, ensuring model traceability and reusability.

- ✓ Implemented intelligent matching algorithms using Retrieval-Augmented Generation (RAG), FAISS vector databases, and rule-based reasoning for semantic entity alignment and virtual renaming.

- ✓ Built an explainable, adaptive, and non-destructive intelligent matching module architecture, supporting both relational and NoSQL data sources.

- ✓ Modeled and automated integration workflows via metamodels and transformation rules, enabling abstraction between structure, semantics, and logic.

- ✓ Delivered a fully functional research prototype, validated through real-world schema integration scenarios, showing significant improvements in matching accuracy and development efficiency.

Technologies and Methods: MDE, Metamodeling, ATL/QVT, Python, FAISS, LangChain, RAG Pipelines, PostgreSQL, Docker, NoSQL, Semantic Matching, GitHub.

ERITECH Groups – Sfax

📺 **July 2025 – September 2025**

Context: Summer Internship

Field: Home Automation – Adapting Open-Source Solutions to Client-Specific Needs

- ✓ Customized the open-source SUPLA DEVICE library.
- ✓ Developed IoT systems based on ESP32 microcontrollers.
- ✓ Integrated Siemens S7-1200 PLC data via OPC UA.
- ✓ Deployed and managed applications on Firebase.

Technologies: Python, Java, Raspberry Pi, VMware, Embedded Linux, IoT, OVH, Git/GitHub.

Confiserie TRIKI – Industrial Company – Sfax

🖥 **February 2022 – June 2022**

Context: Bachelor's Final Project – Developer Role

Field: Industry 4.0 – Real-Time Supervision and Decision-Making

- ✓ Designed and developed a mobile supervision application.
- ✓ Built an IoT system using Raspberry Pi boards.
- ✓ Integrated Siemens S7-1200 PLC data via OPC UA.
- ✓ Deployed and hosted the application on Firebase.

Technologies: Python, Java, Raspberry Pi, VMware, Embedded Linux, IoT, Siemens S7-1200, OPC UA, Git/GitHub.

ISET Sfax – University Project

🖥 **June 2021 – August 2021**

Context: Advanced Training Internship

Field: Surveillance Systems

- ✓ Designed electronic boards based on ESP8266.
- ✓ Used Arduino boards for prototyping.
- ✓ Studied Xiaomi devices as reference systems.

Technologies: MicroPython, C/C++, Xiaomi devices, ESP8266, ESP32.

Tunisian Post Office – Sfax Branch

🖥 **August 2020 – September 2020**

Context: Introductory Internship

Field: Networks and Post Office Operations

- ✓ Discovered fiber optic infrastructure installation.
- ✓ Assisted customers and performed basic counter operations.

Technologies: TCP/IP, Fiber Optics, LAN, Customer Communication.

ACADEMIC PROJECTS

Generative AI – Context-Aware Image Generation using RAG and CNN

- ✓ Developed an innovative system that integrates Retrieval-Augmented Generation (RAG) with Convolutional Neural Networks (CNN) to enable context comprehension and image synthesis.
- ✓ Designed a dual-stream architecture where textual context is retrieved via RAG pipelines and aligned with visual embeddings extracted by CNNs.
- ✓ Enabled semantic cross-modality understanding, allowing the model to generate or enhance images consistent with textual or situational context.
- ✓ Trained and tested the model on open medical and natural image datasets to evaluate contextual fidelity and visual realism.
- ✓ Implemented an interactive API using FastAPI for on-demand image generation and context interpretation.
  Keywords: RAG, CNN, Generative AI, Multimodal Understanding, Context Reasoning, PyTorch, LangChain, FastAPI, OpenCV.

Deep Learning – Semantic Analysis of YouTube Comments

- ✓ Scraped football U-21 tournament comments using the YouTube API.
- ✓ Built a dataset linking comments to player names.
- ✓ Applied TF-IDF and Word2Vec vectorization.
- ✓ Suggested top young talents based on mention frequency.
- ✓ Predicted the most positive comments using deep learning models.
  Keywords: Scraping, Data Preparation, Vectorization, Deep Learning, LSTM, TF-IDF, Word2Vec.

Business Intelligence – AdventureWorks 2019

- ✓ Designed a constellation (galaxy) data warehouse schema.
- ✓ Built ETL processes using SSIS and SSAS for OLAP cubes.
- ✓ Developed a .NET REST API to query cubes using MDX.
- ✓ Built a deep learning API with Flask for regression tasks.
- ✓ Created a real-time dashboard using React and Recharts JS.
  Keywords: SQL Server, ETL, SSIS, SSAS, MDX, .NET, React, Flask, Dashboarding, Git/GitHub.

E-Commerce – Online Armory

- ✓ Designed UML diagrams for a full web application.
- ✓ Developed a Laravel REST API backend.
- ✓ Implemented JWT authentication, roles, and permissions.
- ✓ Added CRUD operations for products, categories, and subcategories.
- ✓ Integrated Stripe for online payments.
- ✓ Built an admin dashboard using React and Recharts JS.
- ✓ Deployed the application on Vercel.
  Keywords: MySQL, PHP, Laravel, JWT, Stripe, React JS, Tailwind CSS, Dashboarding, Git/GitHub, CI/CD.

Web Application – Carpooling Platform

- ✓ Designed UML and use case diagrams.
- ✓ Developed the backend with Laravel and JWT authentication.
- ✓ Integrated Google Maps API.
- ✓ Created admin and user dashboards with Angular TS.
- ✓ Deployed backend on Vercel and frontend on Firebase.
  Keywords: TypeScript, MySQL, Laravel, JWT, Angular TS, MVC, Tailwind CSS, Firebase, Vercel, CI/CD, Git/GitHub.

Mobile Application – Quiz App

- ✓ Designed UI with Figma.
- ✓ Developed logic with Flutter.
- ✓ Integrated external quiz API.
- ✓ Deployed on Firebase.
  Keywords: Firebase, Flutter, Dart, HTTP, Shared Preferences, Git/GitHub.

Mobile Application – Bus Ticket Reservation

- ✓ Designed UI with Figma.
- ✓ Built the app with Flutter and Firebase Authentication.
- ✓ Integrated Google Maps and Stripe APIs.
- ✓ Enabled real-time bus tracking.
- ✓ Deployed on Firebase Hosting.
  Keywords: Firebase, Dart, Flutter, Figma, HTTP, API, CI/CD, Git/GitHub.

Certifications

- ✓ CDOSS: Big Data Machine Learning avec Apache Spark
- ✓ Ceriport: Programmation orienté objet avec Pyhton