Mohamed Rayan Barhdadi

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Interests

Machine Learning, Deep Learning, Data-Centric AI, Large Data Handling, Computer Architecture, Hardware/Software Co-Design, Trustworthy AI, Embedded Systems

Education

Texas A&M University, Qatar Campus — Aug 2023-Present
Bachelor of Science with Honors — Graduation: May 2027
Specialization: Electrical Engineering with minor in Mathematics and Physics
Award: Engineering Honors Program

ELARAKI International School, Marrakech, Morocco — Sept 2020-June 2023
Baccalaureate with Distinction (French) - Physical Sciences

On-Going Work

Novel diagnostic tool and API for transformer fault prediction using Machine Learning.

Posters and Presentations

M. R. Barhdadi, advised by Dr. Selma Awadallah. *Transformer Monitoring: A Comprehensive Multidimensional Database for Dissolved Gas Analysis.* [Poster]. Presented at the Hamad Bin Khalifa University STEAM Showcase, 2024.

Developing an AI powered multi-sport marketplace [Co-presented]. Qatar Foundation Technology-Based Ideas Pitch Competition, HiEd Entrepreneurship & Innovation Summit, 2024 (HiEd '24).

Research Experience

Research Collaborator, Undergraduate Research Experience Program — Jan 2025-Present
Qatar Research, Development and Innovation Council

- Developing a robust framework using Machine Learning (ML) and advanced data analytics to analyze historical Dissolved Gas Analysis (DGA) patterns and identify critical fault trends for improved transformer monitoring.
- Benchmarking Machine Learning (ML)-based methods against traditional DGA techniques (+90% vs. 50% accuracy).
- Building an API to process DGA test results, environmental, and operational factors enhancing scalability and confidence in predictive transformer fault analysis.

Undergraduate Research Assistant, with Dr. Selma Awadallah — Feb 2024-Dec 2024
Electrical and Computer Engineering Department, Texas A&M University

- Led an independent project focused on Dissolved Gas Analysis (DGA) for transformers, developing a publicly accessible DGA monitoring database.
- Designed and managed a specialized SQL database using MySQL for DGA data analysis, including authoring a comprehensive user guide.
- Collected, clustered, and cleaned data from 1,000+ transformers, totaling over 18,200 samples.
- Developed Python and SQL scripts for data extraction and visualization tasks, streamlining database management and access using XAMPP and phpMyAdmin.
- Conducted in-depth literature reviews and composed detailed research report.

Mentor/Assistant, High School Research Experience Program — Feb 2024-Dec 2024
Qatar Research, Development and Innovation Council in collaboration with Texas A&M University
Effect of Heat on Solar Panel Efficiency Project

- Mentored two selected high school students in their research projects focused on the effect of heat on solar panel efficiency in Qatar across different seasons.
- Conducted and supervised weekly data collection using the HOBO monitoring device and sensors to track on temperature, wind speed, direction, and solar radiation. Over the span of 10 months.

Other Experience

Qatar Foundation - Student Housing, *Front Desk Assisstant* — Nov 2024-Present
TAMUQ - Marketing and Communications Department, *Student Assistant* — Oct 2024-Present
Izu Studio - Motion Design Agency, *Founder & Motion Designer* — June 2020-Aug 2024
LAMALIF Group - Information Technology and Finance Department, *Intern* — Summer 2020

Technical Skills

Programming Languages, Tools, Frameworks, Concepts:

- **Programming Languages:** Python, SQL, C Language, Verilog HDL, HTML, CSS.
- **Machine Learning and Data Analysis Libraries:** scikit-learn, PyTorch, TensorFlow, Pandas, NumPy, Matplotlib, Seaborn, SciPy, SymPy.
- **Software Tools and IDEs:** Intel Quartus II, Jupyter Notebook, VS Code, MobaXterm, MySQL Workbench, phpMyAdmin, XAMPP, HOBOlink.
- **Design and Media Tools:** Blender, LaTeX, Adobe Suite (After Effects, Media Encoder, Photoshop, Illustrator), Microsoft Office Suite (Excel, Word, PowerPoint).

Projects

ECEN 248 - Hexadecimal 7-Segment Synthesizer with Dr. Hussein Alnuweiri Fall 2024

- Designed a Fan-In Constrained Hexadecimal Synthesizer integrated into a 16-bit counter system.
- Systematically optimized logic circuits using Karnaugh maps and Boolean algebra, achieving a 33% reduction in gate count, and hardware requirements while maintaining circuit accuracy and functionality.
- Developed unoptimized and optimized versions of the 7-segment decoder; rigorously tested functionality and quantified performance improvements in propagation delay and resource utilization.
- Introduced advanced techniques to minimize logical overlaps and maximize circuit efficiency, aligning with constraints on fan-in and hardware costs.

Selected Achievements

2025 First Place Invent for the Planet by Texas A&M University Engineering – $1,650.
2025 Best Prototype Award Invent for the Planet by Texas A&M University Engineering.
2025 Best Video Award Invent for the Planet by Texas A&M University Engineering.
2025 Awardee of Student Leadership Exchange Program (SLEP) Grant – $2,000.
2024 Winner of Qatar Foundation Technology-Based Ideas Pitch Competition – $11,000 investment.
2024 Awardee of the selective Undergraduate Research Experience Program (UREP 31-043-2-014) by Qatar Research Development and Innovation Council (QRDI) – $1,500.
2024 2nd Place Texas A&M University Qatar Robotics Competition.
2024 Lead Organizer and Mentor in "Effective Humanitarian Engineering Solutions Workshop".
2024 Successfully Completed: Machine Learning for Facies Classification Workshop by SLB.
2024 Successfully Completed: Arduino Programming Course by TAMUQ EEP.
2023 Successfully Completed: Engineering Asset Management in Power Grids Workshop.
2023 Inducted in Engineering Honors Program at Texas A&M-Q.

Leadership and Community Involvement

The Peace Club TAMU-Q, *President*	Spring 2025
The Peace Club TAMU-Q, *Vice-President*	Fall 2024
Qatar Foundation, *Student Orientation Leader*	Fall 2024
Qatar Foundation Convocation 24', *Student Volunteer*	Spring 2024
IEEE, *Student Member*	Fall 2023-Present
IEEE Student Chapter, *Class Representative*	Fall 2023-Spring 2024
Moroccan National Swimming Federation, *Instructor Volunteer*	Summer 2022

Languages

English (Fluent), French (Fluent), Arabic (Native)

References

Dr. Hussein Alnuweiri
Professor of EE at Texas A&M University Qatar, **Email:** alnuweiri@tamu.edu.

Dr. Ali Ghrayeb
IEEE Fellow and Professor of EE at Texas A&M University Qatar, **Email:** ali.ghrayeb@qatar.tamu.edu.

Dr. Selma Awadallah
Assistant Professor of EE at Texas A&M University Qatar, **Email:** selma.awadallah@tamu.edu.