

Edward Arthur Quarm

MACHINE LEARNING · OPTIMIZATION · OPERATIONS RESEARCH

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Summary

I build algorithms that help machines think independently. For 5 years I have developed algorithms to tackle challenging problems in operations research, machine learning and energy. Problems I love to solve are scheduling, portfolio optimization and data fitting problems. I bring extensive skills in developing solutions in stochastic optimization, mixed-integer programming, linear and non-linear programming. In my spare time I enjoy taking pictures!

Work Experience

Pacific Northwest National Laboratory

Washington, USA

ANALYTICS INTERN

June 2021 - September 2021

- Implemented stochastic optimization algorithm for multi-scenario Hurricane contingency analysis on Puerto Rico 1,200-bus Mesh Network.
- Formulated optimization problem with the objective to minimize generator operation cost and minimize network losses subject to operation and network constraints.
- Validated simulation results (power and voltage set-points) in PSS/E and PowerWorld power systems modeling tools.

The University of Texas at Arlington

Texas, USA

RESEARCH ASSISTANT

Jan. 2017 - June 2021

- Modeled power system optimization problem of minimizing operation cost subject to technological constraints while considering uncertainty in problem formulation in MATLAB CVX framework.
- Reformulated the Mixed-Integer Program (MIP) by applying convex relaxations which make formulations scalable and tractable to be solved by MOSEK interior point solver.

Ensto Inc.

New York, NY

MACHINE / DEEP LEARNING INTERN

June 2019 - Aug. 2019

- Developed robust constraints for Mixed-Integer Programming algorithm to optimize project scheduling for clients in the construction industry while maximizing profits (Portfolio Optimization).
- Implemented python code to train image detection convoluted neural network (CNN) to identify objects such as walls, windows, rooms etc. in 2D floor plans for clients in the construction industry.

Institute of Automatic Control

Aachen, GERMANY

CONTROL SYSTEMS INTERN

Jan. 2016 - July 2016

- Modeled state-space model of a 4 MW wind turbine drive-train and test bench in MATLAB
- Applied optimization algorithms to develop an H-infinity controller to emulate eigen frequencies of the mechatronic system in MATLAB robust optimization toolbox
- Successfully tested the working H-infinity controller in Hardware-in-the-Loop (HIL) dSPACE setup

Education

The University of Texas at Arlington

Texas, USA

PH.D ELECTRICAL ENGINEERING

May 2017 - Dec. 2021

Research Focus: Massively Scalable Computational Methods for Power System Scheduling in Electricity Markets
Advisor: Dr. Ramtin Madani

Université Grenoble Alpes

Grenoble, FRANCE

MSC. SYSTEMS CONTROL AND INFORMATION TECHNOLOGY

Sept. 2015 - Nov. 2016

Thesis Topic: Robust Multivariable Control of a Hardware-In-the-Loop (HIL) simulation for a 4 MW system test bench for wind turbines
Advisor: Dr. Uwe Jassmann

Kwame Nkrumah University of Sci. & Tech. (KNUST)

Kumasi, GHANA

BSC. ELECTRICAL & ELECTRONIC ENGINEERING

Sept. 2009 - July 2013

Thesis Topic: Electrical Impact Analysis of Grid-Connected Solar PV Systems on Distribution Grids - A Penetration level Study
Advisor: Dr. Emmanuel K. Anto

Publications

- **E. Quarm Jnr** and R. Madani, “**Scheduling under Transient Load Uncertainty via Cone Programming Relaxation**” - 2021 Submitted for publication in IEEE Transactions on Power Systems
- **E. Quarm Jnr** and R. Madani, “**Scalable Security-Constrained Unit Commitment under Uncertainty via Cone Programming Relaxation**” - in IEEE Transactions on Power Systems, vol. 36, no. 5, pp. 4733-4744, Sept. 2021.
- **E. Quarm Jnr**, F. Zohrizadeh and R. Madani, “**A Scalable Computational Method for Security-constrained Unit Commitment with Energy Storage**” Abstract presented at INFORMS Annual Meeting, 2018
- F. Zohrizadeh, M. Kheirandishfard, **E. Quarm Jnr** and R. Madani, “**Penalized Parabolic Relaxation for Optimal Power Flow Problem**” 57th IEEE Conference on Decision and Control, 2018

Skills

Technical expertise

Python, PyTorch, Tensorflow, Keras, Scikit-learn, SQL, Github
PSS/E, PowerWorld, CPLEX, GUROBI, MOSEK, GAMS, CVX framework
Mathlab & Simulink, C++, SAS, \LaTeX

Natural Languages

English (*mother tongue*), French (*full professional proficiency*) and German (*beginner*)

References

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PNNL

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