RÉSUMÉ

Michael A. Boateng

Current Address: 100 10th St NW, Atlanta, GA 30309
LinkedIn: linkedin.com/in/mkabo
Email: mboateng6@gatech.edu
GitHub: https://github.com/MichaelBoateng
Phone: 1-706-474-2036
ORCID: https://orcid.org/0009-0008-9564-8104

EDUCATION AND QUALIFICATIONS

School of Engineering, Georgia Institute of Technology, Atlanta, GA *Aug 2023 – Jun 2028*
Doctor of Philosophy (Ph.D.), Electrical and Computer Engineering.
- Graduate Research Assistant – AI Institute for Advances in Optimization (AI4OPT) | Energy Division
- **Georgia Tech Supervisors:** Prof. Pascal Van Hentenryck and Prof. Daniel Molzahn
- **External Industry and Academic Mentors:** Dr. Russell Bent (LANL) and Prof. Parikshit Pareek (IIT Roorkee)

School of Engineering, Georgia Institute of Technology, Atlanta, GA *Aug 2023 – May 2025*
Master of Science (MS.), Electrical and Computer Engineering. CGPA: 3.80/4.0
- Minor: Industrial and Systems Engineering (ISyE) – *Regression Analysis, Deterministic & **Convex Optimization***
- Coursework: ***Power Systems** (Protection, Cybersecurity, Operation & Control), Linear Systems & Control*

Engineering Department, Ashesi University, Accra, Ghana *Sep 2018 – Jun 2022*
Bachelor of Science (B.Sc.), Electrical and Electronics Engineering. Cum laude
- B.Sc. Project: Overall Best Thesis – Engineering Department [Published in IEEE Xplore| Citations: 10]

RESEARCH EXPERIENCE

Graduate Research Consultant, Austin, TX *Oct 2025 – Present*
Electric Reliability Council of Texas (ERCOT), *Risk Assessment of Texas Grid Using AC SCOPF*
- Collaborating with ERCOT engineers on machine learning approaches for Security-Constrained AC Optimal Power Flow (AC SCOPF) and great than N-10 contingency analysis, using real-world operational data from the Texas grid
- Developing a self-supervised primal-dual learning framework that incorporates AC non-linearities into preventive SCOPF pipelines, with the goal of enhancing grid reliability under large-scale system conditions (1000+ buses)

Graduate Research Intern, Los Alamos, NM *May 2025 – Present*
Los Alamos National Laboratory (LANL), *End-to-End Learning for AC Feasibility Restoration in DCOPF*
- Designing an LMP-preserving DCOPF-ACPF pipeline that learns DCOPF parameters and generator participation factors, and computes pseudo-LMPs from AC-PF Jacobian sensitivities to keep AC prices aligned with DC outcomes
- Implementing implicit-function gradients—KKT adjoints for DC-OPF and a single transpose-Jacobian solve for AC-PF —to enable end-to-end training in Python with NumPy/SciPy, PyTorch, CVXPY, and OSQP/GUROBI
- Prototyping fast feasibility restoration with smooth voltage-reactive power handling, while exploring tap/shunt policies to cut recalculations and runtime on large test cases by 90%, compared to conventional approaches

Graduate Research Intern, Los Alamos, NM *Sept 2024 – Aug 2025*
Los Alamos National Laboratory (LANL), *Exploring DCOPF and ACPF Formulations for AC Feasibility*
- Engineered a unified DCOPF→ACPF recovery pipeline combining four loss-aware DC models with AC feasibility restoration techniques including distributed slack allocation, PV/PQ bus switching, and voltage-informed initialization
- Evaluated the pipeline on 10,000+ stochastic dispatch scenarios across large-scale power systems, demonstrating feasibility restoration in the major cases and reducing inequality constraint violations by 3–5× under extreme loading
- Reduced Newton-Raphson convergence iterations by ~50% in stressed test cases and eliminated active/reactive power violations across challenging industry-grade networks, including PEGASE and RTE benchmark systems
- Achieved 75% lower mean absolute error and 93% cost difference reduction compared to traditional single-slack methods, showing the effectiveness of incorporating line losses and distributed control in DCOPF formulations

Graduate Research Assistant, Atlanta, GA *Apr 2025 – Oct 2025*
AI Institute for Advances in Optimization (AI4OPT), *Volt-VAR Optimization for Large-Scale Power Systems*
- Designed a transmission-scale Volt/VAR Optimization framework that co-optimizes OLTC tap ratios and capacitor-bank modules under AC power-flow physics, implementing a relax–round–resolve pipeline, that encodes device limits
- Formulated operations-aligned objectives that hold voltage and VAR setpoints while penalizing active-power redispatch and preserving economic dispatch, integrating ACOPF/market references for AC-feasible setpoints
- Performed an extensive review of transmission-scale Volt/VAR and discrete ACOPF (MINLP, relax–round–resolve, cutting-plane/OA, homotopy, metaheuristics, interior-point); pinpointing gaps in *(i)* scalable AC-feasible tap/shunt schedules, *(ii)* realistic device step modeling, and *(iii)* coordination with market dispatch and loss/price sensitivities

Graduate Research and Teaching Assistant, Atlanta, GA *Oct 2024 – Present*
Georgia Institute of Technology (Georgia Tech), *Design Fundamentals (ECE 3011), Digital Design Lab (ECE 2031*)
• Introduced faculty and students to Electronic Design Automation (EDA) as an alternative to Eagle and Altium, and created a full set of lectures and video guides to support final-project Printed Circuit Board (PCB) design
• Leading the development of MPower Boards (MPBs), integrating 3-D printing, LED technology, and real-time simulations to create a physical, interactive model of power grids for enhanced educational and research
• Advancing commercialization with Georgia Tech's Create-X program by building a portable, battery-powered device, scoping IP for a provisional patent, and piloting IEEE-14/30/39 classroom demos, to visualize grid line faults

Graduate Research Assistant, Atlanta, GA *Jun 2024 – Jul 2024*
Georgia Institute of Technology (Georgia Tech), *Forecasting Power Consumption in Morocco using Regression*
• Trained and evaluated four regression models—Multiple Linear, Ridge, Lasso, and Elastic Net—on over 52,000 observations, using an 80/20 train-test split and environmental predictors like temperature, humidity, and wind speed
• Applied statistical preprocessing techniques (normalization, standardization, and correlation filtering), revealing strong intra-zone correlations (e.g., Zone 1 to overall demand: $\varrho = 0.959$) and weak relevance of wind speed and diffuse flows
• Achieved best generalization with Lasso Regression, reducing Mean Absolute Error to 134.79 and avoiding overfitting observed in MLR (MAE = 3.04) by balancing model complexity with predictive accuracy, stability, and robustness

HONORS AND AWARDS

LANL Grid Science Winter School & Conference: Travel Grant Winner, NM, USA *Jan 2025*
Argonne Department of Energy's CyberForce® Competition: Travel Grant Winner, IL, USA *Nov 2024*
International Solid-State Circuits Conference: Travel Grant Winner (1 of 4, 1st Year ECE PhDs), CA USA *Jan 2024*
National Society of Black Engineers Conference: NSBE50 Scholarship, GA USA *Mar 2024*
Silver Medalist: Poster Presentation, International Genetically Engineered Machine *(Competition),* France *Oct 2022*
1st Place: Engineering Poster Presentation, Statistics Poster Session *(College)*, Ghana *Dec 2019*
1st Place: Innovation Research Competition, Royal Crown Packaging Limited *(Company)*, Ghana *Jun 2019*

RECENT PRE-PRINTS/ PUBLICATIONS

- **M.A. Boateng**, R. Bent, S. Misra, P. Park, P. Van Hentenryck, and D.K. Molzahn, "Towards AC Feasibility of DCOPF Dispatch," *Submitted* to the 24th Power Systems Computation Conference (PSCC), 2025.
- S. Tong, **M.A. Boateng**, M. Tanneau, and P. Van Hentenryck, "Volt/VAR Optimization in Transmission Networks with Discrete-Control Devices," *Submitted* to the 24th Power Systems Computation Conference (PSCC), 2025.
- **M.A. Boateng**, G. Gauderman, and B. Ashebo, "Dynamic Error Correction in Current Transformer Merging Units: Evaluating Iterative and Integration Methods for Enhanced Efficiency," *Abstract Submitted* to the 2026 Georgia Tech Protective Relaying Conference (GTPRC), 2025.
- Asiamah, R., Talkington, S., **Boateng, M.**, Vanin, M., Geth, F., & Molzahn, D. (2025). "Classifying Reactive Power Control Laws of Behind-the-Meter Solar Photovoltaic Inverters." *In Proceedings* of the IEEE Kansas Power and Energy Conference (KPEC).

PRESENTATIONS/ TALKS

AI Institute for Advances in Optimization, Industry Partners Meeting, GA, USA *Nov 2025*
Los Alamos National Lab, Lightning Talks T-5 Division, NM, USA *Jul 2025*
IEEE International Conference on Engineering and Emerging Technologies, Kuala Lumpur, Malaysia *Oct 2022*

REVIEWED CONFERENCE/ JOURNAL PAPERS

- 2025 24th *Power Systems Computation* ***Conference*** *(PSCC),* Track: AC-Power Flow, and Volt-Var Optimization
- 2025 *Electric Power Systems Research* ***Journal*** (Elsevier, Impact Factor: 4.2; CiteScore: 8.2). Track: Neural Networks
- 2025 IEEE *Kansas Power and Energy* ***Conference*** *(KPEC),* Track: Solar Power, Transmission and Distribution Systems

LEADERSHIP, ACTIVITIES, AND COMMUNITY INVOLVEMENT

President: Fellowship of Christian Graduate Students, GA, USA *Jul 2025 – Present*
Vice President: Georgia Tech Ghanaian Students Association, GA, USA *Jun 2025 – Present*
Chair, Special Projects and Programs: African Graduate Students Committee, GA, USA *May 2025 – Present*
Co-Captain: International Genetically Engineered Machine Competition (iGEM), Paris, France *Jun – Oct 2022*
Editor-in-Chief: Ashesi Science Engineering Entrepreneurship Design (SEED) Journal, Ghana *2022 – 2023*

SKILLS

- **Languages:** English, Sign Language, C++, MATLAB, PHP, MySQL, HTML, CSS, R, Python, and Julia
- **Tools:** PowerModels, MATPOWER, PG-LIB, Pandapower, PowerWorld, PYPOWER, SciPy, CVXPY, PyTorch, Git