Araz B. Karimi

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EDUCATION

Georgia Institute of Technology — Atlanta, GA **August - 2022**
*Master of Science in Electrical and Computer Engineering (*GPA: 3.5/4)

The University of Tehran — Tehran, Iran **December - 2020**
*Master of Science in Electrical Engineering (*GPA: 3.7/4)

Tabriz University — Tabriz, Iran **July – 2018**
*Bachelor of Science in Electrical Engineering (*GPA 3.9/4)

EXPERIENCE

Custom Engineering Solutions — GA, USA **September 2023-Present**
Electrical Engineer

- Substation Protection and Control Drafting and Designing (DC and AC Elementaries, SCADA, Panel Fabrication, Wiring and Interconnection) using AutoCAD for Utilities in America
- ETAP Power Flow Study and Protection Coordination Report Preparation for Utilities in America
- Transmission line Design with PLS-CADD

Hyperloop Transportation Technologies — Remote, USA **November 2022-September 2023**
Contributor (Power System Designer/Software Developer)

- Feasibility study validation of an Hyperloop transportation line power system including inverters, switches, ESS, and PV system.
- Review of an ETAP-provided conceptual design with power flow, short circuit, and arc flash calculations.
- Development of an optimization tool to select the cost-effective and compliant power system configuration and materials in Python.

Black & Veatch United States — NJ, NY, and Remote **December 2022-August 2023**
Electrical Engineer (Substation Designer)

- Brownfield and greenfield Protection and Control drawing preparation and QA including breaker, line, bus protection panels, SCADA, Fiber, Communication
- LV AC and DC distribution drawings and calculations, Cable estimates, Bill of Material (BOM) preparation, and QA
- Substation calculations such as voltage drop, conduit raceway, station service AC Load, battery, and battery charger sizing (DC calc.), Lightening and Illumination with professional report preparation based on IEEE, NEC, and Company Standards
- 345KV, 230KV, 138KV, and 69KV Physical equipment above grade and below grade layout, section elevation, details, Conduit, Grounding, and cable trench drawings (Both GIS and AIS)
- 4KV Switchgear physical and P&C drawings for Utilities in America
- Construction RFIs, Document filing, PEP, PDM preparation, Status meeting running, and drawing/drafting requests.
- SCADA, RTU, HMI setting with IP, Modbus, DNP, and IEC 61850 for SEL RTAC, NovaTech Orion, and RUGGEDCOM.

East Azerbaijan Distribution Electrical Co. — Tabriz, Iran **August 2018 – December 2018**
Power System and Software Engineer

- Developing an Automated Short Circuit Contingency and Unit Placement Calculation Add-on for PSS/E using C++

Tabriz Thermal Power Plant — Tabriz, Iran **June 2017 – September 2017**
Intern (Electrical and Mechanical)

- Field Experience with 20kV 150MW Stream Turbine Generators, 4kV Switchgear, Transformers, Boiler, 138KV Substation, and other electrical equipment.
- Motor Starting Calculations and Conductor Sizing Study using PSS/E and Technical report preparation and presentation to the Electrical Unit Supervisor

University of Tehran and Georgia Tech — Atlanta, GA and Tehran, Iran **March 2019 - August 2022**
Research and Teacher Assistant, Lab Holder

- Research at the Center for Distributed Energy including Inverter Sizing and Storage Placement optimization in a 100% Inverter-based Grid,, and small signal stability for damping improvement with MATLAB, Power System Protection Relay Library Development.
- Energy conversion Lab Holding including Debugging and troubleshooting of circuits, including Power Electronics, Solar cells, wind turbines, and electrical machines using oscilloscopes and meters Regular device testing and lab preparation
- Research in Power Electronics and Energy Systems Lab including voltage and current imbalance (Power Quality) calculation and minimization, Object-oriented coding in MATLAB, Math power, Convex Optimization, three-phase optimal power Flow, Single and three-phase Electric Vehicle chargers and Solar Panels, Data Visualization, equation linearization, and Machine learning regression. Power Maret Pricing and LMPs.

CERTIFICATES AND PROFESSIONAL TRAINING

E.I.T in progress with New Jersey Board - OSHA 10-hour Construction Safety – Full Substation Design Training in Black and Veatch

SKILLS *(For a Full List Please Refer to Portfolio Skills sheet)*

- **Study Software:** PSCAD, PSS/E, Simulink, CYME, ETAP, SKM, GRIDVIEW, PROMOD, Plexos, PowerGem TARA, ASPEN
- **Design Software:** AutoCAD LT, Revit, COMSOL, Bluebeam, PVSyst, PLS-CADD, Bentley MicroStation
- **Coding:** Python, MATLAB, Shell Scripting, JavaScript, C++, SQL, VBA, Github, Visual Studio, NodeJS, React, NGINX
- **Study Calculation:** Power Flow, Power Market Analysis, Short-Circuit, State Estimation, Unit Commitment, Contingencies and reliability planning, Motor Starting, Arc Flash, AC DC load Calculation, Load Forecasting, Generation Interconnection, Demand Response, Microgrids, Harmonics, Reactive Power, Voltage Drop
- **Design Calculation:** Lighting, Lightning, Battery sizing and placement, Grid code compliance (NEC, IEC, IEEE, ANSI), BESS Design, Inverter Design, Racking and wiring, Control house and switchyard design, transformer bushing design, relay, and SCADA setting.

ACADEMIC COURSES

Power System Digital Protection - Control, and Stability of Microgrids - Power Quality - Power System Dynamics I - Electrical Energy System Analysis - Distribution Network Design - High Voltage Substations - Transmission Line Design - High Voltage Technology -

NOTABLE PROJECTS *(For a Full List Please Refer to Portfolio Projects Sheet)*

Power Flow, Arc Flash, and Coordination Full Analysis and Report using ETAP

Power Flow Report Preparation of a Full Power System of a Utility Client, with automatic Word File creation with all warnings, tables, and figures for 60 Scenarios and Load Categories, Data Visualization of Relay DATA as Appendix.

Substation P&C and Physical: Full Line trap removal and relay change in Physical and P&C Drawings

A remote end Relay change, another relay configuration change, a Line change, and line tuner removal is populated into more than 600 physical and P&C drawings of a substation. Whole schematics, and wiring SCADA and panels change performed accordingly Cable Sizing, Load Estimation, Transformer Selection, Relay Selection, and coordination using Bluebeam, MicroStation, and AutoCAD.

Three-phase unbalanced LV system optimal power Flow with PVs and EVs with Power Quality improvement

A MATLAB code is created to model the three-phase unbalanced system and then perform Optimal Power Flow with several existing and proposed engines. EVs and PVs are integrated as controllable objects into the model. Power Quality measures are implemented in the optimization as a constraint. Several Scenarios were tested and Data Visualization about the Optimal Power Flow is created.

Implementation, testing and setting of Protection relay logic, and a new Data-Driven Distance Relay

First Phase detector algorithms are modeled in MATLAB to extract the magnitude and angle of a signal during fault. On this basis relay protection logic such as Over-current, transformer differential, and distance with Power Swing Blocking is Modelled. Finally, a new method is proposed to improve the performance of the relay during power swings in the marginal faults using real-time spiral regression.

Overhead Transmission Line Design with PLS-CADD

Circuit rating calculations, NESC/Customer electrical clearance requirements, structure selection, and configuration, structure spotting, major transmission line component selection, foundation design, and cable system construction methods specifications using PLS-CADD

Physical Equipment: Transformer Bushing Design

A Bushing is Modelled in COMSOL, and its shape is optimized to reduce electric field tension on the sharp edges

Data pipeline: Automatic Migration of Excel formatted power system Data into CYME

Having information about a Power System in Excel worksheets created manually by the client, I managed to figure out the relation of the CYME Database and then created a code to format and convert their data into the CYME Database without manually modeling the system.

Power System Dynamics: AVR, Governor, and PSS Design for a Generator

The traditional generator is modeled in detail in MATLAB Simulink. A test scenario of a short circuit fault is designed to test the Generator. Then using MATLAB SISO Tool AVR, Governor, and PSS controllers are designed to control the Generator power voltage and improve the stability of the power system.

Full Microgrid Modeling: DC and AC, primary, secondary, and tertiary control design

Two Microgrids, One AC and one DC are created. Several severe transient and power quality phenomena are implemented as scenarios (Model resiliency test). First Buck and Boost inverters to convert DC to AC with L and LCL filters are designed. Then PID and PR controllers are designed using the SISO tool and PID tuner for the inverters. Then these inverters relate to several loads and phenomena are tested. Finally, a tertiary control (System Level) is designed to coordinate and stabilize the inverters in the Islanded Microgrid.

Short-Circuit based DG placement tool for MV Networks

A software native script is developed in C++ to perform short circuit studies in select buses export results for each study and automatically test the results to generate warnings to aid the placement of new Distributed Generation in the system.

Motor Starting Study of Cold Start Scenario in Tabriz Power Plant

Tabriz Power Generation Plant with internal Loads is modeled and motor starting studies are performed to determine the resiliency of the system in Black Start.