

Gayathri KRISHNAMOORTHY

Electrical Engineer| Computer Scientist

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Power Systems Engineer with 5+ years of experience as a researcher at Washington State University and multiple internship experiences at National Laboratories. Worked on several projects developing software tools to efficiently integrate renewable energy resources while making them a significant player in energy markets. I am outgoing, creative, and detail-oriented with strong engineering basics and communication skills. I am effective both solo or on a team. In my spare time I practice yoga, meditation, and painting. I am also passionate about the brain science behind mindfulness practices and keeping up with recent developments in AI.

EDUCATION

Present Jan 2019	Ph.D. in Electrical Engineering , WASHINGTON STATE UNIVERSITY, Pullman, WA <ul style="list-style-type: none">> Research : Learning Methods based Enhancement to enable Frequency Regulation Service Provision from Energy Storage Systems> Major : Power Systems> Minor : Computer Science> Advisor : Dr. Anamika Dubey (WSU)> Co-Advisors : Dr. Anjan Bose (WSU), Dr. Mani Venkatasubramanian (WSU), and Dr. Laurentiu Marinovici (PNNL)
May 2018 Aug 2016	M.S. in Electrical Engineering, WASHINGTON STATE UNIVERSITY, Pullman, WA <ul style="list-style-type: none">> Research : An Iterative Co-simulation Framework for the Integrated Transmission and Distribution System Analysis> Major : Power Systems> Minor : Computer Engineering> Advisor : Dr. Anamika Dubey (WSU)
May 2016 Aug 2012	B.E. in Electronics and Communications Engineering, ANNA UNIVERSITY, Chennai, India <ul style="list-style-type: none">> Title : Smart Home Design with Voice Recognition in a Single Controller (Arduino Uno) Environment> Major : Embedded Systems> Minor : Communications> Advisor : Dr. Suresh T

PROFESSIONAL EXPERIENCE

Present August 2016	Graduate Research Assistant, WASHINGTON STATE UNIVERSITY, Pullman, WA <ul style="list-style-type: none">> Developing imitation learning based improvements in deep reinforcement learning (DRL) methods to solve the optimal power flow problem for a specific case of battery storage dispatch for the power distribution systems. (<i>Python, Tensorflow, Keras</i>).> Combining model-based and model-free deep reinforcement learning techniques to mitigate power system level operational violations with the increasing integration of distributed energy resources (<i>Python, Tensorflow, Keras</i>).> Developed efficient regulation market techniques to enable transmission level frequency regulation service provision using distribution connected battery energy storage systems (<i>Python</i>).> Designed and developed a transmission and distribution (T&D) co-simulation tool to understand the impacts of increasing renewable penetrations on power system operations (<i>MATLAB, Python, and OpenDSS</i>).> Developed an optimal retail market model and performed impact assessment of demand-side renewable resource participation and its integration into the wholesale market (<i>MATLAB, OpenDSS</i>). <div>Python MATLAB OpenDSS PSAT Tensorflow Keras</div>
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Present May 2021	Columnist, THE DAILY EVERGREEN, Pullman, WA <ul style="list-style-type: none"> > Working on many sections to encourage and support women to pursue graduate studies in the United States. > Helping international students acclimate to the cultural and workplace differences in and around the university.
Dec 2019 Jan 2019	Graduate Teaching Assistant, WASHINGTON STATE UNIVERSITY, Pullman, WA Courses : Numerical Computing for Engineers, Professional Skills in Computing and Engineering Tasks : <ul style="list-style-type: none"> > Engaged classes of 100+ undergraduate (multiple engineering discipline) students > Helped the class in learning to use MATLAB (a professional computing software) and Microsoft project professional softwares > Provided my best efforts in evaluating students' homeworks and exams <div> MATLAB Microsoft Project Professional LaTeX </div>
May - Aug 2020 May - Dec 2018	Graduate Research Intern, PACIFIC NORTHWEST NATIONAL LABORATORY, Seattle, WA <ul style="list-style-type: none"> > Developed deep reinforcement learning models to perform AC optimal power flow for the power transmission system optimization. > Assisted in development of a transactive energy software agent, TESP, that optimizes the dynamics of distributed energy resources in a household and bids the excess energy in the energy market to provide monetary benefits to the costumers using electric vehicles, batteries, and PVs. > Performed scalability testing for the open source co-simulation platform (HELICS) developed at PNNL in multiple programming environments. > HVAC market participation simulations in day-ahead and real-time markets using Transactive energy simulation platform (TESP) with HELICS on a Linux environment > Developed docker environment for a microgrid restoration application with FNCS. <div> C++ Python MATLAB MATPOWER GridLAB-D OpenDSS Docker EnergyPlus FNCS TESP HELICS </div>

PROJECTS

TRANSMISSION -DISTRIBUTION CO-SIMULATION

2017 - 2019

 github.com/WSU-DS/Cosimulation  [PSERC T-60](#)

This is my master's thesis work. Here, I developed a framework for the integrated T&D system analysis to understand the impacts of distribution-connected renewable resources (DERs) on transmission system operations and vice-versa (project funded by PSERC). Also, using the co-simulation framework developed, I explored the utility of DER's in transmission system support.

MATLAB OpenDSS Python

GMLC-TDC/ HELICS

2018

 github.com/GMLC-TDC  github.com/GMLC-TDC/MATPOWER-wrapper  [HELICS](#)

HELICS is a coordinated effort by multiple National Labs to develop a large scale real-time simulation platform that aids advanced power system operations. I worked on certain aspects of the development like scalability testing and wrapper development for power system tools like Matpower and PSAT.

C++ Python MATLAB Matpower

TESP

2018

 github.com/pnnl/tesp  [TESP](#)

For this project, I was involved in developing the energy market structure (real-time and day-ahead) for HVAC (heating, ventilation and air conditioning) systems. The major tasks were to develop consensual bidding strategies and to test/validate on large scale power system networks.

Python C++ GridLAB-D EnergyPlus

MODEL-BASED AND MODEL-FREE DISTRIBUTION SYSTEM OPTIMIZATION USING DEEP REINFORCEMENT LEARNING

2020 - PRESENT

 github.com/gayukrishna/DRL-for-Secondary-Control-Services

The goal is to develop an optimization strategy (model-based) and DRL techniques (model-free) to distribute and maintain the scheduled frequency regulation dispatch from the ISO and the distribution level network constraints. I also propose to use imitation learning based hybrid model to scale the reinforcement learning approach for larger systems.

Python Tensorflow Keras

 github.com/gayukrishna/NIPS2020-WSU  NeurIPS 2020

This challenge is the latest round in a series of power network control challenges organized by RTE France (electricity transmission system operator of France). The goal was to control electricity transport in power networks running closer to their operational limits while keeping people and equipment safe. I participated/led two teams (one at WSU and one at PNNL) and successfully stood in the leader board up to the final phase.

   

PUBLICATIONS

- 2019 G. Krishnamoorthy and A. Dubey, "Transmission-Distribution Cosimulation : Analytical Methods for Iterative Coupling", in IEEE Systems Journal.
- 2019 J. C. Bedoya, C. Liu, G. Krishnamoorthy and A. Dubey, "Bilateral Electricity Market in a Distribution System Environment", in IEEE Transactions on Smart Grid.
- 2019 Sen, P.K., Velaga, Y.N., Chen, A., Krishnamoorthy, G. and Dubey, A., 2019, "Advancements in Co-Simulation Techniques in Combined Transmission & Distribution Systems Analysis," The Journal of Engineering.
- 2019 G. Krishnamoorthy, A. Dubey and P. K. Sen, "Iteratively-Coupled Co-simulation Framework for Unbalanced Transmission-Distribution System," 2019 IEEE Milan PowerTech, Milan, Italy, 2019, pp. 1-6.
- 2018 Krishnamoorthy, Gayathri, and Anamika Dubey. "A framework to analyze interactions between transmission and distribution systems." In 2018 IEEE Power & Energy Society General Meeting (PESGM), pp. 1-5. IEEE, 2018.

PROGRAMMING SKILLS

Python ● ● ● ● ●
 C++ ● ● ● ● ●
 MATLAB ● ● ● ● ●
 C ● ● ● ● ●
 HTML ● ● ● ● ○
 Javascript ● ● ● ○ ○
 CSS ● ● ● ○ ○

SIMULATION TOOLS

> Tensorflow
 > Docker
 > OpenAI Gym
 > HELICS
 > Grid2Op
 > OpenDSS
 > GridLAB-D

OFFICE SKILLS

> LaTeX
 > MS Presentation
 > MS Excel
 > MS Word
 > MS OneNote
 > MS Visio
 > Visual Studio

PERSONAL AND PROFESSIONAL ACTIVITIES

- Present Serving as a reviewer for IEEE Power and Energy Society Conferences, Institution of Engineering and Technology Journals, and IEEE Systems Journal
- Present Serving as the Secretary for Graduate Society of Women Engineers at WSU
- Present Working as a Columnist for the university newspaper addressing issues of women and international students in graduate school
- 2020 Participated in WCCI and NeurIPS 2020 learning to run power network challenges
- 2019 Authored a Ph.D. Research Proposal to Pacific Northwest National Laboratory
- 2019, 2018, 2017 Paper and Poster Presentations- IEEE PES General Meeting, Power Systems Engineering Research Center
- 2015 Trained and participated in FreescaleCup Intelligent Car Racing Competition

HONORS AND AWARDS

- 2020 **1st Place** 3-Minute Thesis Competition in Electrical Engineering and Computer Science Department at WSU
- 2019, 2020 **Awardee** Graduate & Professional Student Association Scholarship for the Research Exposition at WSU
- 2018 **2nd Place** Best Student Paper Award at North American Power Symposium
- 2015 **Awardee** Completed course in CCNA Exploration : Network Fundamentals
- 2015 **2nd Place** Texas Instruments India Analog Maker Competition
- 2014 **Awardee** Level 1 Cambridge English Language Assessment in Business English

REFERENCES

Anamika Dubey

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