

# SAQIB HASAN

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## EDUCATION

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### **Vanderbilt University**

Ph.D. in Electrical Engineering

Research Affiliation: Institute for Software Integrated Systems

Overall GPA: 3.675/4

*Nashville, Tennessee*

*Expected-Dec 2018*

### **Anna University**

Bachelor of Electrical and Electronics Engineering

First class with distinction

*Chennai, India*

*May 2010*

## PROFESSIONAL DEVELOPMENT

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### **Institute for Technology and Management(Southern New Hampshire University)**

Masters in Business Administration

*Mumbai, India*

*June 2014*

## RESEARCH EXPERIENCE

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### **Vanderbilt University**

*Graduate Research Assistant*

*Nashville, TN*

*June 2014-Present*

- Designed cyber-physical attack and defense models for both static and dynamic attacks in cyber-physical systems using game-theoretic approach and software engineering.
- Developed optimization algorithms using python for identifying critical components considering both static and dynamic attack and defense models in cyber-physical systems.
- Created a modeling framework for cyber-physical systems using domain-specific modeling language (DSML) to integrate exogenous tools for performing system analysis in multiple platforms in order to identify critical components. Javascript is used to develop the entire framework.
- Developed a simulation testbed using Matlab for systems analysis which considers both cyber and physical failures.
- Tailored custom designed protection assemblies modeled using state machine and developed algorithms for their state flow behavioral models.
- Designed a python based fast and efficient simulator to simulate cascade failure progression for performing both static and dynamic contingency analysis in cyber-physical systems.
- Studied the problem for finding critical contingencies in cyber-physical systems and developed optimized heuristic algorithms using python to provide fast and efficient solutions.
- Formulated algorithms using Matlab to perform distributed computing system analysis for increasing the analysis speed.
- Performed verification on the developed models and algorithms by using power systems as a use case.

## INDUSTRY EXPERIENCE

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### **Emerson Network Power(I)Pvt. Ltd**

*Research Engineer-Research and Development Department*

*Mumbai, India*

*June 2010-April 2014*

- Designed and developed uninterrupted power supplies (UPSs) ranging from 5kVA to 800kVA.
- Designed electrical circuit layouts of the system using AutoCAD/SolidEDGE.
- Performed fault analysis, rectification and root cause analysis of the problems on the newly developed products.
- Managed audits for the Research and Development projects.
- Performed design validation for the new products and prepared detailed reports.
- Interacted with the service team to gather feedback about the newly developed products in order to improve them.
- Prepared physical test jigs for faster and robust system testing for the new products.
- **Major accomplishments:** Improved products, fast, robust and rigorous system testing, better design, detailed documentation on the analysis, rectification and product testing.

## RELEVANT COURSE PROJECTS

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### *Cyber-Physical Systems Semester Project*

- Simulation, analysis and verification of protection equipment behavior for various fault scenarios in a power distribution system.
- **Skills:** MATLAB/Simulink(StateFlow), MATLAB/Script, WebGME, javascript.

### *Model Integrated Computing Semester Project*

- Designed a modeling language to model electrical power transmission systems and generate executable files for system analysis tool.
- **Skills:** WebGME, javascript.

### *Advanced Real Time Systems Semester Project*

- Developed missile avoidance and targeting mechanisms for a battle tank through real time applications using uc/OS-III.
- **Skills:** C, uc/OS-III.

### *Digital Signal Processing Semester Project*

- Developed framework to analyze the frequencies of the musical cords from a given song and re-synthesize them to a user-defined frequency.
- Developed data driven methods to perform automatic speaker recognition.
- **Skills:** MATLAB/Scripts.

### *Other Relevant Courses*

- Hybrid and Embedded Systems, Digital Systems Architecture, Embedded Software and Systems, Power Systems Analysis, Systems Theory, Random Processes, Advanced digital Electronics, Advanced Analog Electronics.

## TECHNICAL SKILLS

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<b>Software Tools</b>	GME, WebGME, Matlab, Simulink, Simscape, PowerWorld, OpenDSS, Auto-CAD, LTspice, Latex, OPAL-RT, Git, SVN.
<b>Programming Languages</b>	Python, Javascript, Java, Matlab, C, C++.
<b>Operating Systems</b>	Microsoft Windows, OS-X, uC/OS-III.

## PUBLICATIONS

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1. "Vulnerability Analysis of Power Systems Based on Cyber-Attack and Defense Models," *IEEE PES Innovative Smart Grid Technologies (ISGT)*, 2018.
2. "A Simulation Testbed for Cascade Analysis," *IEEE PES Innovative Smart Grid Technologies (ISGT)*, 2017.
3. "A Modeling Framework to Integrate Exogenous Tools for Identifying Critical Components in Power Systems," *Modeling and Simulation of Cyber-Physical Energy Systems (MSCPES)*, 2017.
4. "Heuristics-Based Approach for Identifying Critical N - k Contingencies in Power Systems," *Resilience Week (RW)*, 2017.
5. "A Systematic Approach Of Identifying Optimal Load Control Actions For Arresting Cascading Failures In Power Systems," *Cyber-Physical Security and Resilience in Smart Grids (CPSR-SG)*, 2017.
6. "Diagnostics and prognostics using temporal causal models for cyber physical energy systems," *Cyber-Physical Systems Week (CPS Week 2017)*, 2017.
7. "Diagnosis in Cyber-physical systems with Fault Protection Assemblies," *Springer Book on Diagnosis and Diagnosability of Hybrid Dynamic Systems*, 2017.
8. "Cyber-Physical Vulnerability Analysis," *Technical Report Vanderbilt University*, 2016.

## HONORS/ACHIEVEMENTS

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Graduate Tuition Award

2014-Present