PRATISHTHA SHUKLA

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Research Interests: Optimization- Network Resource Allocation and Performance Optimization, Game theory, Queuing theory; **Communications and Cyber-security** - Risk mitigation, Attack detection, Markov chains, Stochastic methods, cloud threats and vulnerabilities; **Control and Power** - Optimal (LQR/LQG), Wide-Area Control, Power Grids, security investment on electric power systems.
Visa Status: F-1

EDUCATION

Ph.D., Electrical & Computer Engineering *2016 - 2021*
North Carolina State University, Raleigh, NC

- *Thesis:* Game-Theoretic Investment Planning for Cyber-Security of Network Control Systems
- *Advisors:* Dr. Aranya Chakrabortty and Dr. Alexandra Duel-Hallen
- *Selected coursework:* Power system and operation, Optimal Control, Robust Control, Algorithmic methods in Non-linear Programming, Advanced Stochastic models, Estimation-detection theory
- *GPA:* 3.83/4

Master of Sciences (M.Sc. Honors) Mathematics and Bachelor of Engineering (B.E) Electrical and Electronics Engineering *2011 - 2016*
Birla Institute of Technology and Sciences (BITS), Pilani, India

- *Masters' thesis:* "Coalitional Formation Approach in Game Theoretic modeling applied to Cognitive Radios". Advisor: Dr. D.K Satpathi
- *Selected coursework (***Mathematics***):* Probability and Statistics, Optimization, Graphs and Networks, Differential Equations, Mathematical Methods, Discrete Mathematics, Operations Research, Numerical Analysis, Real and Functional Analysis.
- *Selected coursework (***EEE***):* Power systems, Control Systems, Communication Systems, Digital Design, Digital Signal and Image Processing, Power Electronics, Cryptography.
- *GPA:* 8.67/10 with First Division

EXPERIENCE

Oak Ridge National Laboratory Ongoing
Postdoctoral Research Associate - Energy Systems *Oak Ridge, TN*

- Working on Edge computing methods for high renewable integration in smart grids
- Computation Sciences and Engineering Division
- Advanced Computing Methods for Engineering Systems Section
- Computational Systems Engineering and Cybernetics Group

FREEDM Systems Center, ECE Dept., North Carolina State University 2016-2021
Research Assistant *Raleigh, NC*

- Formulation of security games and development of algorithms for security investment for networked control systems with applications to electric power systems.

ECE Dept., North Carolina State University 2017-2019
Teaching Assistant *Raleigh, NC*

- ASIC and FPGA Design with Verilog – Graduate Course
- Introduction to Signals, Circuits and Systems – Undergraduate Course
- Special Topics in ECE: Optimization and algorithms – Graduate Course
- Fundamentals of Logic Design – Undergraduate Course

Information Sciences Institute, University of Southern California Summer 2017
Visiting Research Scholar *Los Angeles, CA*

- Group: Internet and networked systems (Cybersecurity, Cyber-Physical systems):

· Lay framework of a linear dynamic system on DETER testbed bridging the gap between cyber and physical systems using python.

Intel India Technology Pvt. Ltd. Bangalore Jan 2016 - July 2016
Design Verification Engineer, Intern *Bangalore, India*

· Design Verification Team - Development of verification test bench to analyze the Design under Test (DUT) as per Design For Test (DFT) specifications used for Silicon Test Characterization and Debug.

Indian Institute of Science (IISc) Bangalore Summer 2014
Summer Research Fellow *Bangalore, India*

· 'Markov Chains-Riffle Shuffle' project endeavored to comprehend the impact of the rising sequences on randomness through Markov chains.

Bharat Heavy Electrical Limited (B.H.E.L) Summer 2013
Intern *Bhopal, India*

· Tasks involved working with the shop floor activities of manufacturing Transformers and Hydro-generators for generation and distribution of energy.

PROJECTS

Lenovo data Center, RTP, NC Aug 2017 - Dec 2017

· Optimizing Customer Service Delivery for Lenovo Data Center Group: A Markov Decision Process (MDP) was developed to provide optimal policies for service delivery actions for Lenovo Data Center (at RTP, NC) using regression, data and predictive analysis.

Study Oriented Project in Mathematics, BITS Aug 2014 - Dec 2014

· A study of Higher Dimensional Cosmological Models was conducted and a model was developed based on multi-linear algebra and tensor analysis.

Design Oriented Project in Mathematics, BITS Jan 2015 - May 2015

· A Kaluza-Klien Model in $f(R,T)$ Gravity was investigated to solve a set of field equations in space using differential equations to propose a model of the universe.

Study Oriented Term Project in EEE, BITS Jan 2015 - May 2015

· A survey on Long Term Evolution (LTE) was conducted aimed at explaining LTE as a cellular technology with its characteristics and architecture, also, the technologies that made LTE popular as it is were investigated.

Design Oriented Term Project in EEE, BITS Jan 2015 - May 2015

· Reduction of Voltage Sag/Swell Using DVR: A Dynamic Voltage Regulator (DVR) was studied and developed on Simulink MATLAB to compensate for voltage sags and swells, which are one of the major concerns for Transmission of Power.

SELECTED PUBLICATIONS

· James Nutaro, Benjamin Stump, and **Pratishtha Shukla**, "Discrete event cellular automata: A new approach to cellular automata for computational material science", *Computational Materials Sciences Journal, 2023.*
· **Pratishtha Shukla**, Lu An, Aranya Chakrabortty, and Alexandra Duel-Hallen, "A Robust Stackelberg Game for Cyber-Security Investment in Networked Control Systems", *IEEE Transactions of Control Systems Technology, Sept. 2022.*
· Lu An, **Pratishtha Shukla**, Aranya Chakrabortty, and Alexandra Duel-Hallen, "Scalable Security Investment Methods for Voltage Stability of Power Systems", *submitted to Automatica, 2022.*
· **Pratishtha Shukla**, Aranya Chakrabortty, and Alexandra Duel-Hallen, "A Cyber-Security Investment Game for Networked Control Systems", *American Control Conference (ACC), Philadelphia, pp 2297-2302, Aug 2019.*
· **Pratishtha Shukla** and Dipak Kumar Satpathi, "Coalitonal Game Theoretic model applied to Relay Spectrum Sensing", *International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT), Chennai, pp. 420-425, Nov 2016.*

· **Pratishtha Shukla** and Amritha Jayadev, "LRS Bianchi type-I cosmology with gamma law EoS in $f(R,T)$ gravity", *Applications and Applied Mathematics Journal , Vol. 11, pp. 229-237, June 2016.*

TECHNICAL SKILLS

Languages	Proficient in MATLAB, Python, High Performance Computing (HPC), Familiar with: C
Software	MATLAB, LaTeX, Visual Studio Code, GitLab, GitHub, AutoCAD, Ubuntu, Simulink, Excel

ACADEMIC ACHIEVEMENTS

· Awarded Summer Research Fellowship of Indian Academy of Sciences for Research internship at IISC Bangalore.
· Awarded Merit Fellowship (2016-2017) by the department of ECE at North Carolina State University.
· Awarded the Best Student in Physics, Secondary education, CBSE 12^{th} Board, 2011