PARITOSH P. RAMANAN

CONTACT INFORMATION

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RESEARCH INTERESTS

Methodology: Decentralized Optimization, Distributed Computing, Asynchronous Computation, Large Scale Mixed-Integer Optimization
Applications: Blockchain Based Decentralized Applications (dApps), Federated Machine Learning, Cyber Physical Systems, Power Systems, Data Privacy and Security

EMPLOYMENT

NASA HOME Postdoctoral Fellow, **Georgia Institute of Technology**, Atlanta, GA — Nov 2020 - Present
Anomaly detection using Vertical Federated Learning for improved resiliency in smart habitats on Mars.

EDUCATION

Georgia Institute of Technology, Atlanta, GA
Ph.D., Computational Science and Engineering — October 2020
- Thesis Title: *Decentralized Optimization for Large Scale Power Systems*
  - Scalable, asynchronous, multi-threaded decentralized solutions of Mixed Integer problems.
  - Blockchain based, data privacy preserving, decentralized cyber attack detection mechanisms.
- Advisors: Nagi Z. Gebraeel and Edmond Chow

Georgia State University, Atlanta, GA
M.S., Computer Science — August 2015
- Thesis Title: *INDIGO: An In-Situ Distributed Gossip System Design and Evaluation*
  - Design, development of a seismic tomography testbed with BeagleBone Black and XBee radios.
  - Participated in field deployment and evaluation on Llaima volcano, Chile.
- Advisor: WenZhan Song

Birla Institute of Technology and Science-Pilani, Goa Campus, Goa, India
M.Sc(Tech), Information Systems — August 2013

PREPRINTS/ SUBMITTED WORKS

[1] Ramanan P., Yildirim M., Gebraeel N. and Chow E. "Large-Scale Maintenance and Unit Commitment: A Decentralized Subgradient Approach", submitted to ***IEEE Transactions on Power Systems***

[2] Ramanan P., Li D. and Gebraeel N. "A Decentralized Blockchain based Cyber ThreatDetection for Power Systems", submitted to ***IEEE Transactions on Systems, Man and Cybernetics: Systems***

[3] Ramanan P., Yildirim M., Gebraeel N. and Chow E. "Decentralized and Secure Generation Maintenance with Differential Privacy", submitted to ***IISE Transactions***

[4] Glusa C., Ramanan P., Boman EG. and Rajamanickam S. "Asynchronous One-Level and Two-Level Domain Decomposition Solvers,", arXiv preprint arXiv:1808.08172

JOURNAL PUBLICATIONS

[1] Ramanan P., Yildirim M., Chow E., and Gebraeel N. "An Asynchronous, Decentralized Solution Framework for the Large Scale Unit Commitment Problem" ***IEEE Transactions on Power Systems***, 34 (5), 3677-3686, Sept. 2019.

[2] Ramanan, P., Kamath G. and Song WZ. "INDIGO: An In Situ Distributed Gossip Framework for Sensor Networks." ***International Journal of Distributed Sensor Networks***, 11(10), 76-83, Oct 2015

CONFERENCE PUBLICATIONS

[1] Dan Li, Ramanan P., Nagi Gebraeel, Kamran Paynabar "Deep Learning based Covert Attack Identification for Industrial Control Systems" ***IEEE ICMLA 2020***, Miami, Florida, December 2020

[2] Ramanan P., Nakayama K. "BAFFLE : Blockchain based Aggregator Free Federated Learning" ***IEEE Blockchain 2020***, Rhodes Island, Greece, November 2020 (acceptance ratio: 0.16)

[3] Ramanan P., Yildirim M., Chow E., and Gebraeel N. "Asynchronous Decentralized Framework for Unit Commitment in Power Systems" ***International Conference on Computational Science (ICCS 2017)***, Zurich, Switzerland, June 2017 (acceptance ratio: 0.25)

[4] Kamath G., Ramanan P. and Song WZ. "Distributed Randomized Kaczmarz and Applications to Seismic Imaging in Sensor Network" ***IEEE International Conference on Distributed Computing in Sensor Systems (IEEE DCOSS)*** Fortaleza, Brazil, May 2015

[5] Ramanan P., Kamath G. and Song WZ. "NetTomo: A Tomographic Approach towards Network Diagnosis" ***IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (IEEE WoWMoM)*** Boston, MA, June 2015 (acceptance ratio: 0.21)

[6] Kamath G., Song WZ., P. Ramanan, Shi L. and Yang J.,"DRISTI: Distributed Real-Time In-Situ Seismic Tomographic Imaging" ***IEEE International Conference on Ubiquitous Computing and Communication (IEEE IUCC)*** Liverpool, UK, October 2015

[7] Ramanan P., Gaikwad P., and Vidyadharan S. "Achieving connectivity in an Unstructured Wireless Sensor Network using Optimal Assignment of Mobile Nodes" ***International Conference on Networking (ICN)*** 2013, Seville, Spain, Jan 2013

Book Chapters

- Ramanan P., "Conflict Reduction and Deterrence in the Power Grid of the Future: A Cyber Security Perspective", ***Emerging Technologies and Future of Conflict Deterrence: Governance, Development, Diplomacy, and Armed Conflict***, under review at Routledge Press.

Patents

- Ramanan P., Nagi Gebraeel "BLOCKCHAIN-BASED DECENTRALIZED COMPUTING", Provisional Patent filed USPTO Application Number 63050218, July 2020.

Honors and Awards

- Winner of the Institute of Information Security and Privacy (IISP) Demo Day 2020 Commercialization Track for Blockalytics.
  - Judged as the most innovative solution for ensuring privacy and reducing computational cost for Industrial IoT analytics.
  - Awarded a cash prize of $5000.
- Co-founder of **blockalytics.io**, selected for CREATE-X startup competition with a $34,000 seed award
  - The CREATE-X program is highly competitive with acceptance rates historically being around 14% with 350 competing teams comprising of 1000 participating students.
  - Blockalytics was inspired by national security loopholes in the power grid discovered during research conducted during the Sam Nunn Fellowship Program
- Recipient of the Sam Nunn Security Program(SNSP) Fellowship 2018-2019
  - Delivered an invited talk on cyber security deterrence for the U.S. power grid at the Special Operations Command Centre (SOCOM) of the United States Department of Defense in Tampa FL in May 2019.
  - Delivered briefings on technical aspects of multi-modal cyber security threats faced by the US power grid system to:
    - Fmr. Deputy Secretary of Energy, Dr. Elizabeth Sherwood-Randall
    - Fmr. Vice Chairman of the Joint Chiefs of Staff, Retd. Admiral James Alexander Winnefeld Jr.
    - Fmr. Supreme Allied Commander Europe (SACEUR) of NATO Allied Command Operations, Retd. General Philip Mark Breedlove

Presentations

- Blockchain based Decentralized Global Cyber Attack Detection for Power Systems,
  INFORMS Annual Meeting 2020, online
- Blockchain based Cyber Analytics for Large Scale Power Systems,
  IISE 2020 Annual Meeting, online
- Decentralized Multithreaded Maintenance For Large Scale Power Systems,
  INFORMS Annual Meeting 2019, October 20-23, Seattle, WA

- Decentralized Asynchronous Framework for Large Scale Power System Planning Problems, IISE 2019 Annual Meeting, May 19-21, Orlando, FL
- Asynchronous Decentralized Framework for Unit Commitment in Power Systems, SIAM CSE 2019, Feb 25-Mar 1, Spokane, WA
- Asynchronous Large-scale Decentralized Unit Commitment, INFORMS Annual Meeting 2018, November 4-7, Phoenix, AZ
- ACHILES: An Asynchronous Iterative Linear Solver, SIAM Parallel Processing 2018, March 7-10, 2018, Tokyo, Japan
- Scalable static deployment pattern for WSNs, ICICIC 2012, Dec 2012, Chennai, India

Industry Experience

Graduate Research Intern, (Summer 2019)
Energy Management Division, NEC Laboratories America, San Jose, CA
Blockchain based Decentralized Federated Learning, Mentor: Dr. Kiyoshi Nakayama

Graduate Summer Research Intern, (Summer 2017)
Computer Science Research Institute, Sandia National Laboratories, Albuquerque, NM
Asynchronous Iterative Linear Solvers, Mentor: Dr. Siva Rajamanickam

Service

- Session Chair : Addressing Computation and Market Integration Challenges in Power Systems, INFORMS Annual Meeting 2019.
- Reviewer: IEEE Transactions on Power Systems, Computational Optimization and Applications

Graduate Coursework

- *Computational Science*: High Performance Computing, High Performance Parallel Computing, Numerical Linear Algebra, Iterative Methods for Linear and Non-Linear Systems
- *Computer Science (Systems)*: Blockchain and Cryptocurrencies, Wireless Sensor Networks, Optical Networks, Operating Systems, Computer Organization and Architecture, Computer Networks, Database Systems and Applications.
- *Computer Science (Theory)*: Machine Learning, Data Structures and Algorithms, Discrete Math, Theory of Automata, Programming Languages.
- *Operations Research*: Linear Optimization, Integer Optimization, Theoretical Statistics

Teaching Experience

Teaching Assistant:
- ISyE3770: Statistics and Applications (Fall 2015), Georgia Tech
- CS C313/IS C313 : Object Oriented Programming and Design (Fall 2012), BITS-Pilani, Goa

References

Nagi Z. Gebraeel
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Georgia Institute of Technology

Edmond Chow
Associate Professor
School of Computational Science Engineering echow@cc.gatech.edu
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