

Paritosh P. Ramanan

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Objective

To acquire knowledge and expertise in the field of large scale decentralized optimization problems with industrial applications.

Education

PhD Computational Science & Engineering

08/2015 - present

H.Milton Stewart School of Industrial and Systems Engineering,
College of Engineering,
Georgia Institute of Technology, Atlanta, Georgia
Research Topic : Large-Scale Decentralized Optimization Framework for Power Systems
Advisors : Prof. Nagi Gebraeel (ISYE), Prof. Edmond Chow (CSE)

MS Computer Science

08/2013 - 07/2015

Department of Computer Science,
College of Arts and Sciences,
Georgia State University, Atlanta, Georgia
Thesis Title : *INDIGO: An In-Situ Distributed Gossip System Design and Evaluation*
Advisor : Prof. Wen-Zhan Song

M.Sc(Tech) Information Systems

08/2009 - 07/2013

Department of Computer Science & Information Systems
Birla Institute of Technology and Science, Pilani (BITS-Pilani), Goa, India

Research Experience

Graduate Summer Research Intern

05/2019 - 08/2019

Energy Management Group, NEC Laboratories of America, San Jose, California, USA

- Worked on decentralized Deep Reinforcement Learning framework using batch Q learning approach for smart asset management.
- Developed a scalable Federated Learning mechanism designed for blockchain platform with total decentralized control capabilities.
- Implemented an agile Solidity based SmartContract for decentralized model sharing over a private Ethereum blockchain network.
- Framework was applied towards taxi ride dispatching and improving driver decisions leading to a revenue increase of upto 30%.

Graduate Summer Research Intern

05/2017 - 08/2017

Computer Science Research Institute, Sandia National Laboratories, Albuquerque, New Mexico, USA

- Developed ACHILES, a distributed memory Asynchronous Iterative Linear Solver based on Message Passing Interface(MPI) and Remote Memory Access (RMA) semantics.
- ACHILES is a C++ based High Performance Computing (HPC) solver for scalable asynchronous computation for linear problems.
- ACHILES outperformed synchronous versions on 2D finite difference problems using overlapping Jacobi Schwarz.
- ACHILES matrix vector products outperformed the synchronous version in Trillinos on a number of large sparse matrices.

Graduate Research Assistant

08/2015 - present

H.Milton Stewart School of Industrial and Systems Engineering, Georgia Institute of Technology

- Developed a decentralized optimization framework for solving large-scale Mixed Integer power system optimization problems.
- Formulation involved an Alternating Direction Method of Multipliers (ADMM) based regional decomposition scheme for power flow balance among regions in a peer-to-peer manner.
- Implemented a Python based HPC solution using MPI RMA with synchronous and asynchronous communication capabilities for efficient parallelization of the above mentioned formulation.
- Successfully solved generator maintenance problem for the IEEE 118 & 3012 bus case with real-time sensor data driven analytics in a decentralized manner.
- Solved the hourly unit commitment problem asynchronously leading to a paper that was accepted at ICCS 2017.
- A detailed analysis of the asynchronous method for Unit Commitment is presented in a journal paper that was accepted in IEEE Transactions on Power Systems.
- Developed decentralized scalable blockchain based analytics for identifying cyber attacks on large scale power systems with complete data privacy.

Graduate Research Assistant

08/2013 - 07/2015

Sensorweb Research Lab, Department of Computer Science, Georgia State University

- Developed INDIGO, a decentralized IOT optimization framework based in C, for solving convex seismic tomography problems.
- Developed an iterative learning algorithm for identifying regions in the network having high latency, high delay in large scale Wireless Mesh Networks culminating in a paper accepted at IEEE WoWMoM 2015.
- Developed radio communication software module for hardware nodes consisting of MSP430 microcontroller and an XBee Pro S3B radio, participated in deployment of 20 such nodes on a volcano in Llaima, Araucania, Chile in January 2015.
- Wrote a survey paper on parallel computing techniques powering the blockchain for Bitcoin cryptocurrency (<https://paralleltermpaper.weebly.com/>)

BITS-Pilani, Goa, India

- Worked on approaches to establish connectivity by assigning mobile nodes in unstructured Wireless Sensor Networks (WSNs).
- Also proposed techniques for optimal placement of sensor nodes in a large scale WSN.

Preprints/Submitted Works

- *Asynchronous One-Level and Two-Level Domain Decomposition Solvers*, Christian Glusa, [Paritosh Ramanan](#), Erik G Boman, Edmond Chow, Sivasankaran Rajamanickam, arXiv preprint arXiv:1808.08172

Publications

- *An Asynchronous, Decentralized Solution Framework for the Large Scale Unit Commitment Problem*, [Paritosh Ramanan](#), Murat Yildirim, Edmond Chow and Nagi Gebraeel, Accepted to IEEE Transactions on Power Systems (accepted: 3/19).
- *Asynchronous Decentralized Framework for Unit Commitment in Power Systems*, [Paritosh Ramanan](#), Murat Yildirim, Edmond Chow, Nagi Gebraeel, Procedia Computer Science, Vol 108, pages 665-674, International Conference on Computational Science, ICCS 2017, 12-14 June 2017, Zurich, Switzerland (acceptance ratio: 0.28)
- *INDIGO : An In-Situ Distributed Gossip Framework for Sensor Networks*, [Paritosh Ramanan](#), Goutham Kamath, Wen-Zhan Song, International Journal of Distributed Sensor Networks (accepted:10/15)
- *Distributed Randomized Kaczmarz and Applications to Seismic Imaging in Sensor Network*, Goutham Kamath, [Paritosh Ramanan](#), and Wen-Zhan Song, IEEE DCOSS 2015, Fortaleza, Brazil, 2015
- *NetTomo: A Tomographic Approach towards Network Diagnosis*, [Paritosh Ramanan](#), Goutham Kamath, Wen-Zhan Song, IEEE WoWMoM 2015, Boston, MA, USA (acceptance ratio: 0.21)
- *Achieving connectivity in an unstructured WSN using optimal assignment of mobile nodes*, [Paritosh Ramanan](#), Prathamesh Gaikwad, Sreejith. V, ICN 2013, Jan 2013, Seville, Spain

Talks

- *Decentralized Asynchronous Framework for Large Scale Power System Planning Problems*, IISE 2019, 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

Posters

- *Decentralized Framework for Sensor-Driven Optimization in Power Systems*, [Paritosh Ramanan](#), Murat Yildirim, Edmond Chow, Nagi Gebraeel, SIAM Computational Science and Engineering, February 27-March 3, 2017, Atlanta, Georgia, USA

Technical Skills

- Programming Languages : C, Python, Solidity, Perl, Java, C++, MATLAB
- Hardware Programming : XBee, BeagleBone Black, TI MSP430
- Libraries/Packages : Keras, Gurobi, GETH (Go-Ethereum), OpenMPI, OpenMP, NumPy, CORE Network Emulator, MySQL

Relevant Courses

- Georgia Institute of Technology : High Performance Computing, Numerical Linear Algebra, Iterative Methods for Linear and Non-Linear Systems, Theoretical Statistics, Data and Visual Analytics, High Performance Parallel Computing, Linear Programming, Integer Programming, Machine Learning, Blockchain.
- Georgia State University : Machine Learning, Parallel Algorithms, Artificial Intelligence, Wireless Sensor Networks and Applications
- BITS-Pilani Goa: Optimization, Operations Research, Numerical Analysis, Data Structures and Algorithms, Operating Systems, Computer Organization and Architecture, Computer Networks, Database Systems and Applications

Professional Experience

Intern in Software Testing, EMC, Bangalore, India — 01/2013 - 06/2013

- Developed a software testing framework for Reliability and Availability testing of EMC NetWorker as part of the QA team of BRS (Backup and Recovery System) division of EMC.

Intern Software Developer, Hindustan Aeronautics Limited, Bangalore, India — 05/2011 - 07/2011

- Developed an Online Exam Manager using ASP.NET and C# as scripting language.

Teaching Experience

- Teaching Assistant for ISYE 3770 : Statistics and Applications, Georgia Institute of Technology, Fall 2015
- Teaching Assistant for CS C313/IS C313 : Object Oriented Programming and Design, BITS-Pilani, Goa, Fall 2012

Fellowships and Awards

- Sam Nunn Security Program(SNSP) Fellow 2018-2019
 - Awarded by the Sam Nunn School of International Affairs at Georgia Tech for research in areas pertinent to national security.
 - Investigated the use of decentralized blockchain and machine learning for cyber security deterrence and preparedness with respect to the U.S. power grid.
- BITS-Pilani Alumni Association(BITSAA) Travel Award in 2013 for presenting research paper at ICN 2013 in Seville, Spain.