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/)

Research Assistant 08/2011 - 12/2012
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.
- 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
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.
- Worked on investigating the use of decentralized blockchain and machine learning as a means for cyber security deterrence and preparedness with respect to the U.S. power grid.

Travel Awards
BITS-Pilani Alumni Association(BITSAA) Travel Award in 2013 for presenting research paper at ICN 2013 in Seville, Spain.