ABISHEK SANKARARAMAN
The University of Texas at Austin

CONTACT INFORMATION

Apt 232, 1020 E.45 Street,
Austin, TX 78751
http://abishek90.github.io

Phone: (+1) 5126985191
Email: abishek.90@gmail.com
abishek@utexas.edu

RESEARCH INTERESTS

Applied Probability, Social Networks, Randomized Algorithms, Machine Learning

EDUCATION

The University of Texas at Austin   **September 2013 -**
PhD in Communications Networks and Systems
GPA - 4.0/4.0

Indian Institute of Technology Madras, Chennai   **July 2008 - May 2013**
B.Tech in Electrical Engineering
M.Tech in Communications
Minor in Mathematics
CGPA - 9.23 out of 10 (Highest CGPA in Electrical Engineering (Dual Degree))

PUBLICATIONS

1. **A. Sankararaman**, F. Baccelli "CSMA k-SIC - A Class of Distributed MAC Protocols and their Performance Evaluation", Proceedings of *IEEE INFOCOM* 2015, [*Accepted*]

2. **Abishek.S**, B.Narayanaswamy "Congestion Control of Smart Distribution Grids using State Estimation," In Proceedings of *E6 Workshop,IEEE COMSNETS*, January, 2013

SCHOLASTIC ACHIEVEMENTS

- Recipient of *DAAD WISE Scholarship* 2011 to pursue research in a German university.

- Secured an *All India Rank 805* in IIT JEE 2008 out of 330,000 students

- *Top 1%* among approximately 40,000 candidates in National Level **Physics Olympiad** and National Level **Chemistry Olympiad**, 2007.

RESEARCH PROJECTS

Dense Wireless Networks - Distributed Access Algorithms
Advisor : Prof. François Baccelli
- The focus of this project was to propose distributed algorithms for Medium Access Control in Dense Wireless Networks. Most protocols in use widely today treat Interference as noise which is not Information Theoretically optimal. The goal, was to propose and develop tools to analyze protocols that employ more suitable schemes such as Joint Decoding or Successive Interference Cancellation (SIC).

- We proposed and evaluated a class of distributed protocols called CSMA k-SIC protocols which in a systematic fashion incorporate SIC on top of existing 802.11 CSMA architectures.
  The results to appear in the proceedings of Infocom 2015.

Learning large Sparse Graphs - Sufficient Conditions   **Aug 2012 - May 2013**
Advisor: Dr. Radhakrishna Ganti, Department of Electrical Engineering, IIT Madras
- Conducted research on efficient network (graph) reconstruction techniques using aggregated end-to-end measurements (primarily delays) between a subset of nodes in a graph.

- Proved theoretical results on the minimal amount of resources sufficient to guarantee near accurate sparse random graph reconstruction. *(Thesis is available on my web page).*

Smart Grids - State Estimation and Congestion Control   **May - July 2012**
Advisor: Dr. Balakrishnan Narayanaswamy, IBM Research, Bengaluru.
- Research problem - Techniques to reduce *congestion* in electric distribution grids by *scheduling* electric loads.

- Congestion control was proven to be achieved by first solving the *State Estimation* problem to estimate grid voltages on all nodes, and then using subsequently using only the estimates for control action.

- Formulated the estimation of a smart grid's distribution system as an inference problem on a probabilistic graph model (factor graph) which has well known solutions (Belief propagation).
- Validated the performance of the loopy BP (an approximate algorithm for non-trees structure) by showing a way to relax it as a convex optimization problem .

Event based Virtual MPSoC Debugging   May - July 2011
Advisor: Dr.Rainer Leupers, RWTH Aachen, Germany
- Defined and implemented a debug and control interface for MPSoC *(Multi Processor System on Chip)* debugging on virtual embedded systems
- Designed and developed processor IP *independent* interface to facilitate non-intrusive access to simulated systems.
- **Tested** the system on two virtual processors, ARM9 and Tensilica Xtensa.

INDUSTRY EXPERIENCE	

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Nihon Communications Pvt. Ltd, Bengaluru   May-July 2010
Area of Work : Networks, Simulator Design
- Developed C++ source code to simulate the behaviour of *Sliding Window Protocol*, a data-link layer protocol using the Discrete-Event Simulator paradigm.
- Integrated the simulator into an existing network layer simulator called "QualNet".

TALKS

"Topology Discovery of Sparse Random Graphs", Seminar Talk, IIT Madras   **May-2013**

EXTRA-CURRICULAR ACTIVITIES

- Second Place in **Pan IIT Data Analytics Contest** held by American Express, India called 'Amex Analyze This, 2012'.
  This was a nation wide data mining contest where each team needed to learn and *predict* the future batsmen and bowler ranking using past team and individual performances.
- Winner of Industry Defined Problem, a techno-business event at Shaastra 2011 (annual technical festival of IIT Madras).
  Proposed a technique to incorporate *social relevance* into Mobile Recommendations.
  The solution model was judged by a panel from the telecom company *Ericsson*.
- Selected to represent IIT Madras and was ranked 15th in India at the national level finals of **ACM Inter Collegiate Programming Contest**, Amritapuri, December 2010.
- Winner of *Circuit Design Challenge*, Shaastra 2010.
- Built an *autonomous maze navigating robot* for the image processing based autonomous robotics competetion at Shaastra 2009 and was placed 3rd out of 50 teams.
- **National Social Service (India)** - Performed weekly teaching activities in an under privileged school in Chennai. (*Aug 2008 - May 2009*)

SKILLS

- Programming: C, C++, Python
- Scientific: MATLAB, Scilab

RELEVANT COURSES

- Probability & Stochastic Process (*Graduate*)
- Information Theory
- Advanced Networks (Stochastic Geometry)
- Image Signal Processing
- Data Structures and Algorithms
- Theory of Computation
- Mathematical Logic
- Calculus - I and II

- Coding Theory
- Queuing Networks
- Randomized Algorithms
- Graph Theory
- Non-Linear Control Systems
- Digital Communications
- Wireless Communications
- Communication Systems