Maheswaran Sathiamoorthy

CONTACT INFORMATION

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RESEARCH INTERESTS

Cloud Computing: Coding techniques for distributed storage.
Vehicular Networks: Analysis and design of content distribution strategies that primarily rely on coded storage; design of protocols for inter-vehicular file transfers.

EDUCATION

University of Southern California, Los Angeles, California, USA
Doctor of Philosophy, Electrical Engineering **Aug 2008 – Present**

- GPA: 3.93/4
- Advisors: Prof. Bhaskar Krishnamachari & Prof. Alexandros G. Dimakis

Indian Institute of Technology (IIT), Kharagpur, West Bengal, India
B.Tech(H), Electronics and Electrical Communication Engineering **July 2004 – May 2008**

- GPA: 9.27 out of 10.00
- Ranked 3/50 in the department and 7/650 in the Institute

PUBLICATIONS

- Maheswaran Sathiamoorthy, Wei Gao, Bhaskar Krishnamachari, Guohong Cao "Minimum Latency Data Diffusion in Intermittently Connected Mobile Networks", to appear in *2012 IEEE 75th Vehicular Technology Conference: VTC2012-Spring, 6-9 May 2012, Yokohama, Japan.*
- Maheswaran Sathiamoorthy, Alexandros G. Dimakis, Bhaskar Krishnamachari, Fan Bai, "Distributed Storage Codes Reduce Latency in Vehicular Networks", to appear in *Proceedings of the IEEE INFOCOM Mini-conference, 2012.*
- Majed Alresaini, Maheswaran Sathiamoorthy, Bhaskar Krishnamachari, Michael J. Neely, "Backpressure with Adaptive Redundancy (BWAR)", to appear in *Proceedings of the IEEE INFOCOM, 2012.*
- Sangwon Lee, Sundeep Pattem, Maheswaran Sathiamoorthy, Bhaskar Krishnamachari, Antonio Ortega, "Spatially-Localized Compressed Sensing and Routing in Multi-Hop Sensor Networks", *3rd International Conference on Geosensor Networks*, July 2009, Pages 11-20.

PROJECTS

VANETSim: A Vehicular Network Simulator **Jan 2012 – Present**

- A Java based simulator primarily designed to study coded and uncoded content distribution strategies in vehicular networks.
- The goal is to simulate a city-wide network of vehicles exchanging content with one another.
- Work under progress and is open sourced at https://github.com/madiator/VANETSim.
- Advised by Prof. Bhaskar Krishnamachari in collaboration with General Motors R&D.

Implementation of Regenerating Codes for Hadoop **Sept 2011 – Present**

- Regenerating codes specially designed for data centers are being implemented over Hadoop HDFS
- Based on Facebook's implementation of HDFS-RAID
- Open sourced at https://github.com/madiator/hadoop-20
- About 2x reduction in network utilization and disk I/O during file repairs.
- Advised by Prof. Alex Dimakis.

Network Coding for Vehicular Networks **Aug 2010 – Present**

- Network Coding applied to Vehicular Networks to minimize the delay in content retrieval.
- Obtained theoretical upper bounds on delay and showed regions where Network Coding performs better than naive distribution strategy.
- Simulated on real taxi traces to show the improvement.
- Continued the work at General Motors to test on real vehicles.
- Advised by Prof. Bhaskar Krishnamachari and Prof. Alex Dimakis.

Twitter Retweet Dynamics **Apr 2010 – Present**

- Using data collected from Twitter, we showed an interesting trend between the number of retweets received and the probability of retweeting by Twitter users.
- Work was presented at the *2nd Annual Annenberg Symposium* and was invited to present again at the *3rd Annual Annenberg Reception*.

- Future work involves characterization of Tweets based on their space-time properties, spam detection in Twitter etc.
- Advised by Prof. Antonio Ortega.

Social-aware Data Diffusion **Sep 2010 – Oct 2011**

- Some of the current data diffision strategies involve using mobility information to decide which data to diffuse.
- Our work involves overlaying the social structure on top of the mobility information to perform social-aware data diffusion.
- Advised by Prof. Bhaskar Krishnamachari and Prof. Guohong Cao, PSU.

Implementation of MapReduce **Feb 2010 – Apr 2010**

- Implemented MapReduce (a framework for distributed processing) on USC's High-Performance Computing and Communications (HPCC) cluster consisting of thousands of nodes, as part of a course.
- Used it to study huge network datasets.
- Course (Computer Communications, CS551) advised by Prof. John Heidemann.

Other projects

- Implementation of Nachos, a software that simulates a small OS, involving process management, memory management, interprocess communication, fault tolerance etc. for a course on Operating Systems.
- Flash Scheduling - proposed and analyzed a new scheduling algorithm in a multi-user communication system with varying number of users (term project for Computer Communications course).

Internship Experience

General Motors R&D, Warren, MI
Summer Internship **May 2011 – Aug 2011**

- Developed a new inter-vehicular video sharing application based on GM's existing Wavecast system for vehicular communication.
- Integrated erasure coding into the application for faster distributed file downloads.
- Additionally, developed an Android application to act as the front end (which connects to and controls the Linux based video sharing application wirelessly).

University of Southern California, Los Angeles
Summer Internship **May 2007 – July 2007**

- Worked on the energy reduction of Wireless Sensor Networks using Compressed Sensing
- Compressed Sensing is used to integrate compression and sensing to achieve energy gains as high as 90% in ideal conditions.
- The work involved using wavelet and DCT domains to perform compressed sensing to sense temperature. Sparse random projections were used to effectively reduce the number of communications to the sink. Methods for optimizing the projections were also investigated.

Nanyang Technological University, Singapore
Summer Internship **May 2006 – July 2006**

- Developed an English Continuous Speech Recognizer based on TIMIT Database using HTK software.
- Automated (using Perl scripts) the process of training and testing the Speech Recognizer.
- Worked on Variable Frame Rate Algorithms and tested them on the CENSREC-3 database.
- Researched on Spectral Entropy based Speech Features and came up with modifications along with testing it on the CENSREC-3 database.

Teaching

TA for **Wireless and Mobile Device Networks Design and Laboratory** (Spring 2012).

Skills

Programming Languages: C, C++, Java, Python
Software Experiences: Hadoop, Android, TCP/IP, Matlab, LaTeX, Processing
Databases: MySQL, MongoDB
Scripting Languages: Perl, Linux shell scripting
Hardware Description: Verilog HDL
Web Technologies: HTML, CSS, JavaScript, PHP
Foreign Languages: German [beginner level]

Courses

Analysis of Algorithms	Approximation Algorithms
Queueing Theory	Operating Systems
Computer Communications	Wavelets
Random Processes in Engineering	Distributed Storage Theory

Design and Analysis of Computer Communication Networks
Probabilistic Methods in Computer Systems Modeling

Honours and Awards

- USC Annenberg Fellowship 2008-2010 - University of Southern California
- InfoUSA Summer Fellowship 2007 - University of Southern California
- One of the seven finalists of Trilogy's Pirates of the Corporate, a web 2.0 business plan contest held at Hong Kong.
- Got Amateur Radio License (Grade II) from Ministry of Communications, Government of India in 2003.
- Awarded Rashtrapati Puraskar (President Award) as a Scout (Bharat Scouts and Guides) by the 10th President of India Shri K R Narayanan in 2002.
- Ranked among top 0.5% of about 170,000 students appeared in JEE 2004.

References

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