SOUMYA BASU

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EDUCATION

University of Texas at Austin *Aug 2014 - Present*
PhD in Decision, Information, & Communication Engineering
Adviser: Prof. Sanjay Shakkottai & Prof. Evdokia Nikolova
CGPA: 3.77/4

Indian Institute of Technology, Kharagpur *Jul 2009 - May 2014*
B.tech(Hons) in Electronics & Electrical Communication Engineering
M.Tech in Telecommunication Systems Engineering
Adviser: Prof. Goutam Das
CGPA: 9.53/10

RESEARCH INTEREST

- Algorithm design for stochastic networks with emphasis on asymptotic stability and optimality.
- Mechanism design with a focus on risk averse users.
- Hardness results and approximation algorithms in optimization; non-linear and non convex.

PUBLICATIONS AND WORKING PAPERS

Conference

· Soumya Basu, Thanasis Lianeas, and Evdokia Nikolova. "New Complexity Results and Algorithms for the Minimum Tollbooth Problem". In: *Web and Internet Economics*. Springer, 2015, In Press

· Soumya Basu et al. "Locating primary users in cognitive radio networks by generalized method of moments". In: *GLOBECOM, 2014*. IEEE. 2014

Journal

· Soumya Basu and Goutam Das. "Scheduling Hybrid WDM/TDM Ethernet Passive Optical Networks Using Modified Stable Matching Algorithm". In: *Journal of Lightwave Technology* (2014)

Working Papers

· Soumya Basu et al. "Reconciling Selfish Routing with Social Good". In: 2017, Progress

· Soumya Basu et al. "Adaptive TTL-based caches for Content Delivery". In: 2017, Submission

SCHOLASTIC ACHIEVEMENTS

- **Institute Silver Medal,** 2014 for best academic performance in E&ECE Dual, IIT Kharagpur
- **Best M.Tech Thesis,** 2014 in E&ECE, IIT Kharagpur
- **JBNSTS** Scholar, 2010, **DAAD WISE** Scholar, 2012 & **MITACS** Scholar 2013

EXPERIENCE

- **Intern** at Panlab, CS, University of Victoria, BC. Summer 2013
- **Intern** at EDA Chair, ECE, Technische Universität Munich. Summer 2012
- **Teaching Assistant** for Computer Networks(EE382N), UT Austin. Fall 2014
- **Teaching Assistant** for Digital Communication Lab, IIT Kharagpur. Spring 2014
- **Teaching Assistant** for Analog Communication Lab, IIT Kharagpur. Fall 2013

RESEARCH PROJECTS

Mechanism Design for Risk Averse Routing Oct 2016-Present

· Studying non-atomic routing games under non-separable, nonlinear risk averse users.
· Developing mechanism to enforce social optimal as Nash equilibrium.
· Developed FPTAS for approximating social optimal under risk aversion, showed NP-hardness.

Adaptive TTL-Based Caching for Content Delivery April 2016-Oct 2016

· Designed Dynamic TTL-based caches for provably achieving targeted hit probability and cache size.
· Obtained first theoretical results for two-level caches under non-stationary traffic.
· Employed two timescale Actor-Critic based learning methods.
· Verified the effectiveness of Dynamic TTL caching through evaluation on real traffic in 'Akamai' servers.

Reconciling Selfish Routing with Social Good July 2015-July 2016

· Investigated the effects of path decomposition on various equilibrium concepts in Selfish Routing.
· Proved NP-hardness of balanced path decomposition with optimal social cost.
· Designed algorithms for approximately balanced path decomposition with social cost guarantees.

Algorithms in Minimum Tollbooth Problem (MINTB) Dec 2014-July 2015

· Studied the MINTB problem of inducing socially optimal flow using tolls with minimum support.
· Obtained the first *Hardness of Approximation* on general graphs.
· Designed a *Polynomial Time* algorithm on Series Parallel graphs.

Design of Ethernet Passive Optical Network over Coax(EPoC) July 2013-July 2014

· Devised an end to end analytical model for EPoC via integration of two diverse MAC protocols; CSMA/CD on Coax and TDMA on optical network.
· Proposed a multi-carrier CSMA/CD protocol with high performance guarantees.

Cognitive User based Primary User Localization May 2013-July 2013

· Designed received power based Cognition in learning Primary user location in cognitive radio networks.
· Provided constant time algorithm with localization error bounds.

Hybrid TDM/WDM scheduling in Ethernet Passive Optical Network Sept 2012-May 2013

· Designed a Dynamic Bandwidth Assignment (DBA) in EPON in presence of laser tuning time..
· Proved delay optimality among Pareto points, w.r.t. delay and throughput.

TECHNICAL PROJECTS

- **Machine Learning.** Epileptic Seizure Detection using **State Vector Machine(SVM)** , Customer Satisfaction Prediction **Kaggle Santander** .
- **Distributed Systems.** Stable Song Directory using **Three Phase Commit** , Multi-user Chatroom using **PAXOS** , Gossip based Eventually Consistent Database, **Bayou** , **Modular Direct Memory Access Controller** .

RELEVANT COURSEWORK

- **Probability.** Advanced Probability in Learning and Networks, Markov Chains and Mixing Time, Theory of Probability, Information Theory.
- **Learning.** Large Scale Optimization, Learning with Big-Data, Big-Data using Spark (edX).
- **Algorithms.** Advanced Data structures, Approximation Algorithms, Graph Theory, Theory of Computation, Distributed Algorithms, Adaptive Systems and Signal Processing.

TECHNICAL STRENGTHS

Programming	Python(Scikit, numpy, Pyspark), C, C++
Computation	MATLAB, Mathematica

EXTRA CURRICULAR ACTIVITIES

- Secured 8th position (out of more than 70 teams) in **Overnite** , the night long algorithmic coding contest of Kshitij 2012 (Asias Largest Techno-management fest), certified by ACM/ICPC.
- Active member in the **Literacy Drive Team** of National Social Service Scheme (2010-2011) which conducted voluntary weekly teaching in underprivileged regions in Kharagpur.
- Part of Medal Winning team in **Finearts** events (as Captain) and **Dramatics** events in the **General Social Cultural Championships** in IIT Kharagpur.