

Diksha Gupta

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Qualifications

- Over three years of research experience in Distributed Systems and Algorithm Design.
- Exceptional knowledge of empirical study of algorithms.
- Highly efficient organizational skills; able to successfully meet strict deadlines and manage multiple projects simultaneously
- Highly proficient in oral and written presentation of scientific material.
- Excellent mentoring skills

Education

- 06/2018-12/2019 **Ph.D. Candidate – Computer Science**, Advisor: Jared Saia
University of New Mexico, Albuquerque, NM, USA
- 08/2015-05/2018 **M.S. Computer Science** (GPA – 3.84/4)
University of New Mexico, Albuquerque, NM, USA
- 07/2013-06/2015 **M.Tech in Computer Science** (GPA – 7.89/10), Advisor: Durga Toshniwal
Indian Institute of Technology, Roorkee, India
Thesis Title: Anomaly Detection in Text Stream Data
- 08/2009-06/2013 **B.Tech in Computer Science** (*with Honors – 81.2%*)
Guru Gobind Singh Indraprastha University, New Delhi, India

Employment

- 08/2015-present **Research Assistant in Computer Science**
University of New Mexico, Advisor: Jared Saia

Current Projects:

PoW based defense against DDoS – Design computationally efficient Proof-of-Work based defense mechanisms against Denial of service attacks for open systems.

Handling an adaptive adversary in open systems – Design a Proof-of-Work based technique that handles a mildly adaptive Sybil adversary, where the attacker can take over a fixed number of participants at will, in open systems.

Sybil Resistant DHT – Design a Proof-of-Work based Sybil resistant DHT that is immune to join and leave attack by the attacker such that the honest participants are always connected and an honest majority is always maintained.

Completed Projects:

Complexity of PoW based Sybil Defense - Obtain lower bounds for class of algorithms that use Proof-of-Work as defense mechanism against attacks in open networks. Also, design a protocol with the matching computational complexity for open systems.

Theoretical Comparison of Deterministic vs. Randomized Foraging – Analyzed performance of Deterministic Spiral Search Algorithm (DASA) and compared its performance to Ballistic Central Place Foraging Algorithm, which is a randomized algorithm.

Proof-of-Work Without All the Work - Developed an efficient Proof-Of-Work scheme – CCOM, for use in open systems as defense against a Sybil adversary, which gives the following guarantees- a) maintains a majority of good IDs in the system and b) provide fair share of the system's resources at a cost commensurate with that to the adversary.

Teaching Experience

- 01/2018-05/2018 **University of New Mexico**
Guest Lecturer in Computer Science
CS 527: Introduction to Artificial Intelligence
- 08/2017-12/2017 **University of New Mexico**
Guest Lecturer in Computer Science
CS 561: Algorithms and Data Structures

08/2015-
12/2015 **University of New Mexico**
Teaching Assistant in Computer Science
CS 261: Mathematical Foundations of Computer Science

07/2014-
06/2015 **Indian Institute of Technology, Roorkee, India**
Teaching Assistant in Computer Science
CSN 501: Advanced Algorithms
CSN 515: Data Mining & Warehousing

Publications

Note: In theory conferences and journals, author names are in alphabetical order.

Aggarwal A., **Gupta D.**, Fricke G.M., Vinings W., Moses M. *On Site Fidelity and the Price of Ignorance in Swarm Foraging Algorithms*. Submitted for review.

Gupta D., Saia J., Young M. *Peace Through Superior Puzzling: An Asymmetric Sybil Defense*, Accepted to the 33rd IEEE International Parallel and Distributed Processing Symposium (IPDPS'19), 2019.

Gupta D., Saia J., Young M. *Proof of Work Without All the Work*, 2nd Workshop on Storage, Control, Networking in Dynamic Systems (SCNDS 2018), 2018.

Gupta D., Saia J., Young M. *Proof of Work Without All the Work: Computationally Efficient Attack-Resistant Systems*, (arXiv:1708.01285), February 2018.

Gupta D., Saia J., Young M. *Proof of Work Without All the Work*. Proceedings of the 19th International Conference on Distributed Computing and Networking ([ICDCN](#)). ACM 2018.

Aggarwal, A., Castellanos Joo, J. A., **Gupta, D.** *Beating the Multiplicative Weights Update Algorithm*. (arXiv:1708.04668) 2017

Talks

Jan, 2019 **Proof-of-Work Without all the Work: Computationally Efficient Sybil Defense Techniques, IIT Delhi**, New Delhi, India

Dec, 2018 **Puzzling Sybil into Bankruptcy, 3rd Winter School on Blockchains**, IIAS, Hebrew University, Israel

Nov 2018 **Proof-of-Work based Sybil Defense, Workshop on Competitive Economics of Cybersecurity**, Sandia National Labs, New Mexico

Puzzling Sybil into Bankruptcy: An Asymmetric Sybil Defense, Rocky Mountain Celebration of women in Computing, Denver, Colorado

Jan, 2018 **Proof-Of-Work Without all the Work, ICDCN '18**, IIT (BHU), India

Nov, 2017 **GreenCoins**, Poster Presentation, *Shared Knowledge Conference 2017*, Albuquerque, NM

Dec, 2016 **Stumping Sybil With Computational Puzzles**, Guest Talk, *Mid-South Theory Day*, Louisiana State University, Baton Rouge, LA

Honors

2015-Present **NSF Graduate Research Assistantship** (PhD Semester I - Present), NSF, USA

2013-2015 **Fellowship** (M.Tech Semester I – IV), Ministry of Human Resource Development (MHRD), India

2009-2013 **Director's Merit Award** (B.Tech Semester I - VIII), Guru Gobind Singh Indraprastha University, Delhi, India

Skills

Programming Languages: C/C++ (expert), Matlab (expert), Python (prior experience), Haskell (prior experience)

Computer Networks: Advanced Computer Networks, Information Theory

Database Systems: Relational Design, MySQL, PostgreSQL, SQL Server

Leadership

2019 **Graduate Representative**, UNM Computer Science Advisory Board

2017 - 2018 **Graduate Representative**, UNM Computer Science Advisory Board
President, UNM Computer Science Graduate Student Association (CSGSA)
Organizer, UNM Women In Computing Lecture Series

2016-2017 **Co-Chair**, New Mexico Student Conference 2017 (NMSC 2017)
Treasurer, UNM Computer Science Graduate Student Association (CSGSA)