


Nirupam Gupta 
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Education

Ph.D. Mechanical Engineering, University of Maryland College Park, USA. 2013 - 2018
Dissertation: Privacy in Distributed Multi-Agent Collaboration: Consensus and Optimization. **Advisor:** Prof. Nikhil Chopra.
B.Tech. Electrical Engineering, Indian Institute of Technology Delhi, India. 2009 - 2013

Research Experience

Research areas: optimization, machine-learning and control systems.

Computer Science, EPFL, Switzerland. Postdoc in the [Distributed Computing Laboratory \(DCL\)](#), supervised by Prof. Rachid Guerraoui. 2021 - present
Computer Science, Georgetown University, USA. Postdoc in the [Distributed Computing \(DISC\)](#) group, supervised by Prof. Nitin H. Vaidya. 2019 - 2021
Mechanical Engg., University of Maryland College Park, USA. Research asst. in the control systems group, supervised by Prof. Nikhil Chopra. 2013 - 2018

Teaching Experience

Teaching Faculty, Computer Science, Georgetown University. 2020 - 2021
Seminar course on distributed machine learning, including an introduction to the challenges of security (robustness) and privacy.

PhD Co-Supervision Experience

Sadegh Farhadkhani. PhD Candidate, Computer Science, EPFL, Switzerland. 2021 - present
Youssef Allouah. PhD Candidate, Computer Science, EPFL, Switzerland. 2021 - present
John Stephan. PhD Candidate, Computer Science, EPFL, Switzerland. 2021 - present
Shuo Liu. PhD Candidate, Computer Science, Georgetown University, USA. 2019 - 2021
Kushal Chakraborty. PhD, Electrical and Computer Engineering, University of Maryland College Park, USA. 2018 - 2021

Awards and Honors

Research Awards

Best Paper, [International Conference on Distributed Computing and Networking \(ICDCN\)](#) 2023
Best Paper Runner-up, [International Symposium on Reliable Distributed Systems \(SRDS\)](#) 2022

Scholastic Honors

Merit Scholarship at the Indian Institute of Technology Delhi	2009 - 2010
India Central Board of Secondary Education Scholarship	2009 - 2013
All India Rank (AIR) 190 (<i>out of 380,000</i>) in IIT JEE (Joint Entrance Examination)	2009
AIR 130 (<i>out of 960,000</i>) in AIEEE (All India Engineering Entrance Examination)	2009

Fundings

CHIST-ERA	2023
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Project *TruBrain* was selected in the CHIST-ERA ERA-NET call on *Security and Privacy in Decentralised and Distributed Systems (SPiDDS)*. **PIs:** Ihsen Alouani & Jesus Martinez Del Rincon (*Queen's University Belfast*); Haralampos G. Stratigopoulos (*Sorbonne University*); Rachid Guerraoui & Nirupam Gupta (*EPFL*); Hasan Erdem Yantir & Kaya Demir (*Tubitak Bilgem*). EPFL will receive funds from Swiss NSF, net worth 522,452 CHF, 2024 - 2027.

Outreach and Academic Service

Invited talks:

Tutorial on Byzantine Machine Learning. To be given at the International Symposium on Distributed Computing (DISC'23)	Oct., 2023
Realizing Federated Learning in Untrusted Environment. At the 3rd IEEE Workshop on AI Hardware: Test, Reliability and Security (AI-TREATS)	May, 2023
Distributed Learning with Adversarial Nodes. At the GDR RSD Summer School on Distributed Learning	Sept., 2023
Fault-Tolerant Distributed Gradient-Descent. Data Skeptic podcast	Feb., 2021

Co-organized workshops:

2nd workshop on the Principles of Distributed Learning (PODL) at DISC	Oct., 2023
1st PODL workshop at PODC	July, 2022

Program committee member:

Dependable and Secure Machine Learning (DSML) workshop at DSN	2021 & 2022
Symposium on Reliable Distributed Systems (SRDS)	2023

Reviewer for journals:

IEEE Transactions on Automatic Control (TAC)	2016 - present
IEEE Transactions on Control of Networked Systems (TCNS)	2017 - present
IEEE Transactions on Signal Processing (TSIP)	2018 - present
IEEE Control Systems Letters (L-CSS)	2018 - present
IFAC (International Federation of Automatic Control) <i>Automatica</i>	2017 - present

Short Book

Robust Machine-Learning: Distributed Methods for Safe AI

Rachid Guerraoui, Nirupam Gupta, Rafael Pinot. *(In preliminary agreement with) Springer Nature*.

Journal Publications

1. **Byzantine Machine Learning: A Primer**¹
Rachid Guerraoui, Nirupam Gupta, Rafael Pinot. *ACM Computing Surveys* 2023.
2. **Byzantine Fault-Tolerance in Federated Local SGD under 2f-Redundancy**
Nirupam Gupta, Thinh T. Doan, and Nitin H. Vaidya. *IEEE Transactions on Control of Network Systems* 2023.
3. **On Pre-Conditioning of Decentralized Gradient-Descent when Solving a System of Linear Equations.**
Kushal Chakrabarti, Nirupam Gupta, and Nikhil Chopra. *IEEE Transactions on Control of Network Systems* 2022.
4. **Iterative Pre-Conditioning for Expediting the Distributed Gradient-Descent Method: The Case of Linear Least-Squares Problem**
Kushal Chakrabarti, Nirupam Gupta, and Nikhil Chopra. *Automatica* 2022.
5. **Robustness of Iteratively Pre-Conditioned Gradient-Descent Method: The Case of Distributed Linear Regression Problem**
Kushal Chakrabarti, Nirupam Gupta, and Nikhil Chopra. *IEEE Control Systems Letters* 2021.
6. **Preserving Statistical Privacy in Distributed Optimization**
Nirupam Gupta, Shripad Gade, Nikhil Chopra, and Nitin H. Vaidya. *IEEE Control Systems Letters* 2021.
7. **On Content Modification Attacks in Bilateral Teleoperation Systems**
Yimeng Dong, Nirupam Gupta, and Nikhil Chopra. *IEEE Transactions on Control Systems and Technology* 2018.
8. **Content Modification Attacks on Consensus Seeking Multi-Agent System with Double-Integrator Dynamics**
Yimeng Dong, Nirupam Gupta, and Nikhil Chopra. *AIP Chaos - Journal of Nonlinear Science* 2016.

Conference Proceedings

The authors for papers written with Rachid Guerraoui are listed in alphabetical order, respecting the traditional ways :). For those papers, * on my name indicates that I am a leading author.

1. **On the Robustness of Distributed Machine Learning with Heterogeneous Data**
Youssef Allouah, Rachid Guerraoui, Nirupam Gupta, Rafael Pinot, and Geovani Rizk. *(Spotlight accepted for the) Proceedings of the 37th Conference on Neural Information Processing Systems (NeurIPS), 2023*.
2. **On the Privacy-Robustness-Utility Trilemma in Distributed Learning**
Youssef Allouah, Rachid Guerraoui, Nirupam Gupta, Rafael Pinot, and John Stephan. *Proceedings of the 40th International Conference on Machine Learning (ICML), 2023*.

¹Authors in alphabetical order. Primary authors: Nirupam Gupta and Rafael Pinot.

3. **Robust Collaborative Learning with Linear Gradient Overhead**
Sadeh Farhadkhani, Rachid Guerraoui, Nirupam Gupta*, Lê-Nguyên Hoang, Rafael Pinot, and John Stephan.¹ *Proceedings of the 40th International Conference on Machine Learning (ICML)*, 2023.
4. **Fixing by Mixing: A Recipe for Optimal Byzantine ML under Heterogeneity**
Youssef Allouah, Sadeh Farhadkhani, Rachid Guerraoui, Nirupam Gupta, Rafael Pinot, and John Stephan. *Proceedings of the 26th International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2023.
5. **Impact of Redundancy on Resilience in Distributed Optimization and Learning**
Shuo Liu, Nirupam Gupta, and Nitin H. Vaidya. *Proceedings of the 24th International Conference on Distributed Computing and Networking (ICDCN)*, 2023.
6. **Democratizing Machine Learning: Resilient Distributed Learning with Heterogeneous Participants**
Karim Boubouh, Amine Boussetta, Nirupam Gupta, Alexandre Maurer, and Rafael Pinot. *Proceedings of the 41st International Symposium on Reliable Distributed Systems (SRDS)*, 2022.
7. **Byzantine Machine Learning Made Easy by Resilient Averaging of Momentums**
Sadeh Farhadkhani, Rachid Guerraoui, Nirupam Gupta*, Rafael Pinot, and John Stephan. *Proceedings of the 39th International Conference on Machine Learning (ICML)*, 2022.
8. **Redundancy in Cost Functions for Byzantine Fault-Tolerant Federated Learning**
Shuo Liu, Nirupam Gupta, and Nitin H. Vaidya. *Workshop on Systems Challenges in Reliable and Secure Federated Learning (co-located with the 28th ACM SOSP 2021)*.
9. **Byzantine Fault-Tolerant Distributed Machine Learning with Norm-Based Comparative Gradient Elimination**
Nirupam Gupta, Shuo Liu, and Nitin H. Vaidya. *The 51st Annual IEEE/IFIP International Conference on Dependable Systems and Networks Workshops (DSN-W) 2021*.
10. **Accelerating Distributed SGD for Linear Regression using Iterative Pre-Conditioning**
Kushal Chakrabarti, Nirupam Gupta, and Nikhil Chopra. *Proceedings of the 3rd Conference on Learning for Dynamics and Control 2021 (L4DC'21)*.
11. **Byzantine Fault-Tolerance in Decentralized Optimization under 2f-Redundancy**
Nirupam Gupta, Thinh T. Doan, and Nitin H. Vaidya. *The 2021 American Control Conference (ACC)*.
12. **Differential Privacy and Byzantine Resilience in SGD: Do They Add Up?**
Rachid Guerraoui, Nirupam Gupta*, Rafaël Pinot, Sébastien Rouault, and John Stephan. *The ACM Symposium on Principles of Distributed Computing (PODC)*, 2021.
13. **Approximate Byzantine Fault-Tolerance in Distributed Optimization**
Shuo Liu, Nirupam Gupta, and Nitin H. Vaidya. *The ACM Symposium on Principles of Distributed Computing (PODC)*, 2021.
14. **Preserving Statistical Privacy in Distributed Optimization**
Nirupam Gupta, Shripad Gade, Nikhil Chopra, and Nitin H. Vaidya. *The 59th IEEE Conference on Decision and Control (CDC) 2020*.
15. **Fault-Tolerance in Distributed Optimization: The Case of Redundancy**
Nirupam Gupta, and Nitin H. Vaidya. *The ACM Symposium on Principles of Distributed Computing (PODC)*, 2020.
16. **Iterative Pre-Conditioning to Expedite the Gradient-Descent Method**
Kushal Chakraborty, Nirupam Gupta, and Nikhil Chopra. *The 2020 American Control Conference (ACC)*.

17. **On Distributed Solution of Ill-Conditioned System of Linear Equations under Communication Delays**
Kushal Chakraborty, Nirupam Gupta, and Nikhil Chopra. *The Dec'19 Indian Control Conference*.
18. **Statistical Privacy in Distributed Average Consensus: Bounded Real Inputs**
Nirupam Gupta, Jonathan Katz, and Nikhil Chopra. *The 2019 American Control Conference (ACC)*.
19. **Privacy in Distributed Average Consensus**
Nirupam Gupta, Jonathan Katz, and Nikhil Chopra. *The World Congress of IFAC, 2017*.
20. **Robustness of distributive double-integrator consensus to loss of graph connectivity**
Nirupam Gupta, Yimeng Dong, and Nikhil Chopra. *The 2017 American Control Conference (ACC)*.
21. **Confidentiality in Distributed Average Information Consensus**
Nirupam Gupta, and Nikhil Chopra. *The 55th IEEE Conference on Decision and Control (CDC) 2016*.
22. **On Content Modification Attacks in Bilateral Teleoperation Systems**
Yimeng Dong, Nirupam Gupta, and Nikhil Chopra. *The 2016 American Control Conference (ACC)*.
23. **Stability analysis of a two-channel feedback networked control system**
Nirupam Gupta, and Nikhil Chopra. *The 2016 Indian Control Conference*.

References

Nikhil Chopra. Professor, Mechanical Engineering, University of Maryland College Park, Maryland, USA. *Email:* nchopra@umd.com

Nitin H. Vaidya. Professor, Computer Science (McDevitt Chair), Georgetown University, Washington DC, USA. *Email:* nitin.vaidya@georgetown.edu

Rachid Guerraoui. Full Professor, Computer Science, EPFL, Lausanne, Switzerland. *Email:* rachid.guerraoui@epfl.ch

¹Authors in alphabetical order.