

Ashwin Verma

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RESEARCH INTERESTS

Multi-agent Systems, Networked Dynamical Systems, Distributed Optimization, Stochastic Processes, Applied Probability Theory, Control Theory, Information Theory

EDUCATION

University of California San Diego	2018–2024
<i>PhD, Electrical and Computer Engineering</i>	GPA: 3.972/4.0
<i>Title: Advances in Multi-agent Decision Making Systems with Adaptive Algorithms</i>	Advisor: Prof. Behrouz Touri
Indian Institute of Technology Kanpur	2013–2018
<i>B.Tech, Electrical Engineering</i>	GPA: 9.00/10
<i>M.Tech, Advisor: Prof. Rakesh K. Bansal</i>	GPA: 9.38/10

PUBLICATIONS

PREPRINTS AND UNDER REVIEW

- **A. Verma**, A. Mitra, L. Ye, V. Gupta, “Power-Constrained Policy Methods for LQR,” under review in *IEEE Transactions of Automatic Control*, IEEE
- F. Siahkali, **A. Verma**, V. Gupta, “Coverage Guarantees for Pseudo-Calibrated Conformal Prediction under Distribution Shift,” under review in *IEEE Signal Processing Letters*, IEEE
- V. Kanakeri, S. Bajaj, **A. Verma**, V. Gupta, A. Mitra, “Harnessing Data from Clustered LQR Systems: Personalized and Collaborative Policy Optimization,” under review in *Learning for Dynamics & Control Conference (L4DC)*, PMLR
- **A. Verma**, B. Touri, “Almost-Sure Reachability” in preparation for *IEEE Control Systems Letters*, IEEE

JOURNALS

- **A. Verma**, S. Mohajer, B. Touri, “Multi-Agent Fact Checking,” accepted in *Automatica*, [arXiv:2503.02116](https://arxiv.org/abs/2503.02116)
- **A. Verma**, M. Vasconcelos, U. Mitra, B. Touri, “Maximal Dissent: a State-Dependent Way to Agree in Distributed Convex Optimization,” in *IEEE Transactions on Control of Network Systems*, IEEE, 2023, [doi](#)
- R. Parasnis, **A. Verma**, M. Franceschetti, B. Touri, “A random adaptation perspective on distributed averaging,” in *IEEE Control Systems Letters (L-CSS)*, 7, pp.241-246, IEEE, 2022, [doi](#)

CONFERENCES

- **A. Verma**, B. Touri, S. Mohajer, “Multi-Agent Fact-Checker: Adaptive Estimators,” in 2024 *Conference on Decision and Control (CDC)*, IEEE, 2024, [doi](#)
- **A. Verma**, B. Touri, S. Mohajer, “Distributed Fact Checking: Learning Unreliability,” in 2024 *American Control Conference (ACC)*, IEEE, 2024, [doi](#)
- **A. Verma**, A. Sharbafchi, B. Touri, S. Mohajer, “Distributed Fact Checking,” in 2023 *International Symposium on Information Theory (ISIT)*, pp. 2649-2654, IEEE, 2023, [doi](#)
- **A. Verma**, M. Vasconcelos, U. Mitra, B. Touri, “Max-gossip subgradient method for distributed optimization,” in 2021 60th *IEEE Conference on Decision and Control (CDC)*, pp. 3130-3136, IEEE, 2021, [doi](#)
- **A. Verma**, R. K. Bansal, “Sequential change detection based on universal compression for Markov sources,” in 2019 *IEEE International Symposium on Information Theory (ISIT)*, pp. 2189-2193, IEEE, 2019, [doi](#)

TEACHING AND PROFESSIONAL SERVICE

- Teaching Assistant for Random Processes, Stochastic Processes for Dynamical Systems, Special Topics: Stochastic Approximation Theory and Applications, UC San Diego
- Teaching Assistant for An Introduction to Information Theory, MOOC, Representation and Analysis of Random Signals, IITK
- Reviewer for Journals and Conferences: IEEE-TAC, Automatica, IEEE-TCNS, IEEE-TIT, IEEE L-CSS, IEEE-CDC, IEEE-ACC, ISIT

RESEARCH EXPERIENCE

Multi-Agent Fake News Detection

with Prof. Behrouz Touri, Prof. Soheil Mohajer

Sept 2021–Jun 2024

- Formulated the problem of fake news detection using **distributed fact checkers** with limited and unknown trust.
- Introduced an **online** version of the **Dawid-Skene estimator** used for crowdsourcing labeling tasks.
- Designed an **adaptive protocol** for the estimation of the reliability parameter of the modeled fact-checkers.
- Studied the convergence of the estimates using tools from **stochastic approximation** and control theory.

Maximal Dissent: a state-dependent approach for distributed optimization

with Prof. Behrouz Touri, Prof. Marcos Vasconcelos, and Prof. Urbashi Mitra

Jul 2020–Oct 2021

- Proposed a novel algorithm for the problem of distributed convex optimization through the consensus-based subgradient method, introducing state-dependence in the consensus component of the optimizer.
- Provided analysis to study the convergence of **state-dependent consensus-based subgradient methods**.
- Proposed analysis avoids the necessity of B-connectivity of the communication graph by studying the contraction of Lyapunov function to establish a generalized result for the almost-sure convergence result of the algorithms.

Almost-sure Reachability in Safety Critical Systems

with Prof. Behrouz Touri

Jun 2019–Jul 2020

- Studied the stochastic version of a constant-rate multi-mode system under the constraint that the state of the systems stays within a provided safe set with probability one.
- Determined the reachable set of states when the necessary condition for reachability of the entire safety set is violated.

Asymptotic analysis of Change Point Detection without Post-Change Distribution

with Prof. Rakesh K. Bansal

Jul 2017–May 2018

- Modified the change-point detection algorithm with the use of a universal compression algorithm to estimate the post-change distribution.
- Analyzed the modified algorithm with linear correction terms under constraints on the false alarm in a window for finite order finite state Markov Chains.

WORK EXPERIENCE

Purdue University

West Lafayette, USA | Postdoctoral Research Associate, Guide: Prof. Vijay Gupta

August 2024–Present

- Formulated model-free Linear Quadratic Regulator (LQR) problem with power-constrained communication.
- Introduced a new power allocation method for policy gradient method improving convergence rate over the traditional gradient descent algorithm.
- Developing a causal inference framework for identifying collusion in games through advances in latent causal graph discovery.

Texas Instruments India

Bengaluru, India | Software Engineer, Guide: Sureshkumar Manimuthu

Summer 2016

- Created an application on an embedded system involving a DLP projector and TDA3x SOC chip. The application was designed to control a DLP-based headlight to mask the light falling on a pedestrian.
- Carried out the application development in a link and chain framework using vision SDK.

REFERENCES

- [Prof. Behrouz Touri](#), Associate Professor, Industrial and Enterprise Systems Engineering, University of Illinois Urbana-Champaign.
- [Prof. Soheil Mohajer](#), Associate Professor, Electrical and Computer Engineering, University of Minnesota.
- [Prof. Vijay Gupta](#), Professor, Electrical and Computer Engineering, Purdue University.