GESUALDO SCUTARI

ACADEMIC EMPLOYMENT

Purdue University

Pedro and Barbara Granadillo Professor of Industrial Engineering and Electrical and Computing Engineering, 2024 – present
Professor of Industrial Engineering and Electrical and Computing Engineering, 2021 – 2024
Thomas and Jane Schmidt Rising Star Associate Professor, 2018 – 2021
Associate Professor, 2015 – 2018

State University of New York (SUNY) Buffalo, 2011 – 2015
Assistant Professor

University of Illinois at Urbana Champaign, Urbana-Champaign, IL, 2009 – 2010
Research Associate

Hong Kong University of Science and Technology, 2007 – 2009
Research Associate

EDUCATION

University of Rome, "La Sapienza", Rome, Italy,
Ph.D. (cum laude) in Electrical Engineering, 2007
Laurea Degree (with Highest Honor) in Electrical Engineering, 2003

University of California at Berkeley, Berkeley, CA, 2004 – 2005
Visiting Ph.D. student

ACADEMIC HONORS & AWARDS

1. **Purdue Name Professorship**, 2024
2. **Purdue University Faculty Scholar**, 2023
3. **Purdue College of Engineering Research Excellence Award**, 2023
   Award given annually to one faculty within the entire College of Engineering to have achieved national and/or international recognition
4. **Purdue Seed for Success ACORN Award**, 2023
   Recognizing Purdue PI for acquiring awards of $1 million or more for the first time
5. **IEEE Signal Processing Society Distinguished Lecturer**, 2023-2024
   One of the *five* world-wide Distinguished Lecturer awarded by the IEEE SP Society for 2023-2024
6. **IEEE Fellow**, 2021
7. **2020 IEEE Signal Processing Society Best Paper Award**, 2021
   Most prestigious award given by the IEEE SP Society to honor the author(s) of a paper of exceptional merit appearing in one of the transactions in the last five years
8. **Purdue Endowed Chair**: Thomas and Jane Smith Rising Star Associate Professor, 2018–2021
9. **Best Student Paper Award** (co-author) at the 2017 IEEE CAMSAP
10. **Annamaria Molteni Award for Mathematics & Physics**, 2015
    Awarded by the ISSNAF to a single Italian researcher whose work on Mathematics and Physics has garnered public and/or professional accolades beyond the norm
11. **2014 IEEE Signal Processing Society Young Author Best Paper Award,** 2015
    Most prestigious award given by the IEEE SP Society to honor the author(s) of a paper of exceptional merit appearing in one of the transactions in the last five years
12. **ISSNAF Award for Young Investigators**, 2014
    The highest recognition given every year to the most promising young (i.e., less than 40 years old) Italian researcher in North America & Canada by the ISSNAF

13. **NSF CAREER Award**, 2013;

14. **SUNY Buffalo Exceptional Scholar Young Investigator Award**, 2013

15. **IEEE ICASSP Best Student Paper Award**, 2006
    ICASSP is the world largest and most comprehensive IEEE conference on signal processing and its applications.

RESEARCH AREAS

- Distributed Optimization and Information Processing
- Machine Learning Algorithms
- Mathematical Optimization Theory/Methods and (Engineering) Applications
- Game Theoretical Models/Algorithms and (Engineering) Applications

SPONSORED RESEARCH (SELECTED)

- **National Science Foundation:** 7 Grants (Role in all: PI), including the NSF CAREER Award. Total $\$ \sim 1.8M$
- **Department of Defense (DoD): 5** (Role in all: **sole PI**). Total $\$ \sim 1.9M$
- **Department of Energy (DoE):** 1 (Role: co-PI). Total $\$ \sim 1.5M$
- **Purdue College of Engineering:** 2 (Role: PI). Total $\$ \sim 500.000$.

PROFESSIONAL ACTIVITIES & SERVICES

LEADERSHIP POSITIONS

- **Founding Director** of a university-wide center of Science of Data Analytic (SODA) (it will be lunched in Spring 2025)
- Member of the Purdue Engineering Initiative in Data and Engineering Applications, 2019-2020
- Member of the Purdue Data Science Working Group, 2018–2021
- Thrust Leader for the area of Optimization, Purdue Center for Resilient Infrastructures, Systems, and Processes, 2017–2022
- Director for Big Data Analytics, Purdue Cyber Center, 2015–2016
- Member of the Purdue CoE Preeminent Team on Flexible and Efficient Spectrum Usage[1] 2016 -- present
- Member elected of the IEEE Signal Processing for Communications and Networking Technical Committee, 2012–2014.

EDITORIAL ACTIVITIES

- Associate Editor **SIAM J. on Optimization**, 2020–present
- Guest Editor **IEEE Signal Processing Magazine**, Special Issue on "Non-Convex Optimization for Signal Processing and Machine Learning," 2021
- Senior Area Editor of **IEEE Trans. on Signal Processing**, 2018–2021
- Associate Editor of **IEEE Trans. on Signal and Information Processing over Networks**, 2017–2020
- Associate Editor of **IEEE Trans. on Signal Processing**, 2013–2018
- Associate Editor of **IEEE Signal Processing Letter**, 2012–2013

Selected CONFERENCE Related Services

- Member of the organizing committee of the following international conferences: 1) the 2024 Midwest Machine Learning Symposium (MMLS'24); 2) the 2014 IEEE Workshop on Signal Processing Advances in Wireless Communications; and 3) the 2003 IEEE Workshop on Signal Processing Advances in Wireless Communications.

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[1]Members chosen for the potential/impact of their work and international preeminence.

- Technical program committee member of several IEEE and Optimization conferences.
- Organized and chair of several special sessions at IEEE and Optimization conferences.

KEYNOTES, PLENARY TALKS, and DISTINGUISHED LECTURES

1. *Statistical Inference over Networks: Decentralized Optimization Meets High-dimensional Statistics* **Keynote Speaker** at the 2024 International Conference on Computational Optimization

2. *Statistical Inference over Networks: Decentralized Optimization Meets High-dimensional Statistics* **Keynote Speaker** at the 2024 IEEE International Workshop on Signal Processing Advances in Wireless Communications

3. *Statistical Inference over Networks: Decentralized Optimization Meets High-dimensional Statistics.* IEEE Signal Processing **Distinguished Lecture** Series at the following Institutions:
   - IEEE SPS SBC, *IIT Kharagpur*, India, April 15, 2024.
   - IEEE SPS Oregon Chapter & *Oregon State University*, April 10, 2024;
   - North Jersey Chapter, Nov. 29, 2023;
   - *University of Minnesota*, Nov. 14, 2023, Minneapolis, USA;
   - *King's College London*, July 13, 2023, London, UK;
   - *Imperial College London*, July 12, 2023, London, UK;
   - *IIT Madras*, Feb. 15, 2023 (online on zoom);
   - *IIT Kharagpur*, Feb. 5, 2023 (online on zoom).

4. *Communication Efficient Distributed Machine Learning.* IEEE Signal Processing **Distinguished Lecture** Series, IEEE SEM (Southeasterm Michigan) Chapter, Nov. 21, 2023.

5. *Just Relax: Parallel Distributed Nonconvex Optimization via Successive Convex Approximation.* **Plenary Talk** at the 2017 IEEE International Workshop on Signal Processing Advances in Wireless Communications

6. *Just Relax: Parallel Distributed Nonconvex Optimization via Successive Convex Approximation.* **Keynote Speaker** at the International Workshop on Distributed Information Processing in Wireless Networks, ACM-MobiHoc 2017.

MENTORING ACTIVITIES

POST DOCTORAL SCHOLAR ADVISED
- **S. Kundu**, 2013 (Now at Cruise Automation)
- **Y. Sun**, 2016–2020 (now Assistant Professor at Penn State)
- Dr. **J. Xu**, 2018–2019 (now Assistant Professor, Zhejiang Univ., China)
- **Y. Zheng**, 2018 (now Assistant Professor, Univ. of Connecticut)
- **M. Maros**, 2021-2024 (now Assistant Prof. at Texas A&M)

GRADUATE STUDENTS ADVISED
- **Graduated (7): Peiran Song**, 05/2015 (now Associate Professor at the Beijing Information Science and Technology University); **L. Cannelli**, 08/2019 (now at the Dalla Molle Institute for Artificial Intelligence, Switzerland); **Y. Tian**, 08/2021 (now at Amazon Research); **A. Daneshmand**, 08/2021 (now at Amazon Research); **C.-S. Lee**, 08/2021 (now at Bloomberg L.P.); **T. Tamboli**, M.S. 06/2022 (now at Axtria); **Y. Ji**, 08/2024 (now at Georgia Tech., post-doc).

- **Current (7): T. Cao**, 2026 (expected); **X. Chen**, 2027 (expected); **E. Chen**, 2027 (expected); **P.-C. Chang**, 2027 (expected); **N. Lin**, 2029 (expected); **S. Ilhan**, 2029 (expected); **L. Yuan**, 2029.

Total Google Scholar Citations: 11600, **h-index:** 51 (as of September 2024)[2] **Refereed Book Chapters**

1. Francisco Facchinei*, Vyacheslav Kungurtsev*, Lorenzo Lampariello*, and **Gesualdo Scutari***, "Iterative Complexity of a Fixed-Step SQP Method for NonConvex Optimization with Convex Constraints," *Numerical Analysis and Optimization*, p. 109-120, 2020.

Journal Papers

1. Y. Ji[+], **G. Scutari**⋆, Y. Sun, and H. Honnappa, "Distributed Sparse Regression via Penalization," **J. of Machine Learning Research**, vol. 24, no. 272, pp. 1–62, 2023.

2. Y. Ji[+], **G. Scutari**⋆, Y. Sun, and H. Honnappa, "Distributed (ATC) Gradient Descent for High-Dimension Sparse Regression," **IEEE Trans. on Information Theory**, vol. 69, no. 8, pp. 5253–5276, 2023 [10.1109/TIT.2023.3267742].

3. V. Kungurtsev, M. Morafah, T. Javidi, and **G. Scutari**, "Decentralized Asynchronous Nonconvex Stochastic Optimization on Directed Graphs," early access, **IEEE Trans. on Control of Network Systems**, 2023 [10.1109/TCNS.2023.3242043].

4. N. Michelusi*, **G. Scutari**⋆⋆, and C.-S. Lee[+], "Finite-Bit Quantization for Distributed Algorithms with Linear Convergence," **IEEE Trans. on Information Theory**, vol. 68, no. 11, pp. 7254–7280, Nov. 2022 [10.1109/TIT.2022.3176253].

5. K. Slavakis⋆, G. Shetty, L. Cannelli[+], **G. Scutari**, U. Nakarmi, and L. Ying, "Kernel Regression Imputation in Manifolds via Bi-linear Modeling: The Dynamic MRI case," **IEEE Trans. on Computational Imaging**, vol. 8, pp. 133-147, 2022 [10.1109/TCI.2022.3148062].

6. Y. Sun[\$], **G. Scutari**⋆, and A. Daneshmand[+], "Distributed Optimization Based on Gradient-Tracking Revisited: Enhancing Convergence Rate via Surrogation," **SIAM J. on Optimization**, vol. 32, no. 2, pp. 354-385, 2022 [https://doi-org/10.1137/19M1259973].

7. F. Facchinei*⋆, V. Kungurtsev*, L. Lampariello*, and **G. Scutari***, "Diminishing Stepsize Methods for Nonconvex Composite Problems via Ghost Penalties: from the General to the Convex Regular Constrained Case," **Optimization Methods and Software**, vol. 37, no. 4, pp. 109–120, 2022 [https://doi.org/10.1080/10556788.2020.1854253].

8. F. Facchinei*⋆, V. Kungurtsev*, L. Lampariello*, and **G. Scutari***, "Ghost Penalty in Nonconvex Constrained Optimization: Diminishing Stepsizes and Iteration Complexity," **Mathematics of Operations Research**, vol. 46, no. 2, p. 595–626, 2021 [https://doi.org/10.1287/moor.2020.1079].

9. J. Xu[\$], Y. Tian[+], Y. Sun[\$], and **G. Scutari**⋆, "Distributed Algorithms for Composite Optimization: Unified and Tight Convergence Analysis," **IEEE Trans. on Signal Processing**, vol. 69, pp. 3555–3570, June 2021 [10.1109/TSP.2021.3086579].

10. L. Cannelli[+], F. Facchinei, **G. Scutari**⋆, and V. Kungurtsev, "Asynchronous Optimization over Graphs: Linear Convergence under Error Bound Conditions," **IEEE Trans. on Automatic Control**, vol. 66, no. 16, pp. 4604-4619, Oct. 2020 [10.1109/TAC.2020.3033490].

11. C.-S. Lee[+], N. Michelusi, and **G. Scutari**⋆, "Limited Rate Distributed Weight-Balancing and Average Consensus over Digraphs," **IEEE Trans. on Automatic Control**, vol. 66, no. 10, pp. 4530–4545, Oct. 2021 [10.1109/TAC.2020.3030871].

12. I. Notarnicola, Y. Sun[\$], **G. Scutari**⋆, and G. Notarstefano, "Distributed Big-Data Optimization via Block-wise Gradient Tracking," **IEEE Trans. on Automatic Control**, vol. 66, no. 5, pp. 2045-2060, July 2020 [10.1109/TAC.2020.3008713].

13. A. Daneshmand[+], **G. Scutari**⋆, and V. Kungurtsev, "Second-order Guarantees of Distributed Gradient Algorithms," **SIAM J. on Optimization**, vol. 30, no. 4, 2020 [https://doi-org.ezproxy.lib.purdue.edu/10.1137/18M121784X].

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[2]'+' denotes student co-author (supervised by Scutari); '$' denotes post-doc co-author (supervised by G. Scutari); '*' equal contribution, ⋆ corresponding author.

Authorship order adopted with an advisee (either a student or postdoctoral scholar) is generally advisee followed by faculty members (listed in alphabetical order), unless there is a significant distinction in contributions.

14. Y. Tian[+], Y. Sun[$], and **G. Scutari**⋆, "Achieving linear rate in distributed asynchronous optimization," **IEEE Trans. on Automatic Control**, vol. 65, no. 12, pp. 5264–5269, 2020 [DOI: 10.1109/TAC.2020.2977940].

15. L. Cannelli[+⋆], F. Facchinei[⋆⋆], V. Kungurtsev[⋆], **G. Scutari**[⋆], "Asynchronous Parallel Algorithms for Nonconvex Optimization," **Mathematical Programming**, vol. 184, pp. 121–154, 2020 [https://doi.org/10.1007/s10107-019-01408-w].

16. G. Shetty, K. Slavakis⋆, A. Bose, L. Ying, U. Nakarmi, and **G. Scutari**, "Bi-Linear Modeling of Data Manifolds for Dynamic-MRI recovery," **IEEE Trans. on Medical Imaging**, vol. 39, no. 3, pp. 688–702, March 2020 [10.1109/TMI.2019.2934125].

17. **G. Scutari**[⋆⋆] and Y. Sun[$⋆] "Distributed Nonconvex Constrained Optimization over Time-varying Digraphs," **Mathematical Programming**, vol. 176, pp. 497–544, 2019 [https://doi.org/10.1007/s10107-018-01357-w].
Highly cited paper (ISI Web of Knowledge, 2019, 2020).

18. A. Daneshmand[+], Y. Sun[$], **G. Scutari**⋆, F. Facchinei, and B. Sadler, "Decentralized Dictionary Learning over Time-Varying Graphs," **J. of Machine Learning Research**, vol. 20, no. 139, pp. 1–62, 2019.

Refereed Conference Papers

1. I. Kuruzov⋆, **G. Scutari**⋆, and A. Gasnikov, "Achieving Linear Convergence with Parameter-Free Algorithms in Decentralized Optimization," Proc. **Conference on Neural Information Processing Systems (NeurIPS)**, 2024.

2. M. Maros[$] and **G. Scutari**⋆, "Decentralized Matrix Sensing: Statistical Guarantees and Fast Convergence," Proc. **Conference on Neural Information Processing Systems (NeurIPS)**, 2023.

3. M. Maros[$] and G. Scutari⋆, "A Unified View of Decentralized Algorithms for Sparse Linear Regression," Proc. of the *2023 IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP23)*, Dec. 10–13, 2023, Los Suenos, Costa Rica.

4. M. Maros[$] and **G. Scutari**⋆, "Acceleration in Distributed Sparse Regression," Proc. **Conference on Neural Information Processing Systems (NeurIPS 2022)**, 2022.

10. M. Maros[$] and **G. Scutari**⋆, "DGD^2: A Linearly Convergent Distributed Algorithm for High-dimensional Statistical Recovery" Proc. **Conference on Neural Information Processing Systems (NeurIPS 2022)**, 2022.

11. D. Kovalev, A. Beznosikov, E. Borodich, A. Gasnikov, and **G. Scutari**, "Optimal Gradient Sliding and Its Application to Distributed Optimization under Similarity," Proc. **Conference on Neural Information Processing Systems (NeurIPS 2022)**, 2022 (**Spotlight, acceptance rate 4%**).

12. Y. Tian[+], **G. Scutari**, T. Cao[+], and A. Gasnikov, "Acceleration in Distributed Optimization under Similarity," Proc. **International Conference on Artificial Intelligence and Statistics (AISTATS 2022)**, 2022.

13. A. Daneshmand[+⋆], **G. Scutari**[⋆⋆], P. Dvurechensky, A. Gasnikov, "Newton Method over Network is Fast up to Statistical Precision," Proc. **International Conference on Machine Learning (ICML 2021)**, PMLR vol 139, pp. 2398-2409, 2021.

14. A. Beznosikov, **G Scutari**, A. Rogozin, and A. Gasnikov, "Distributed Saddle Point Problems under Similarity," Proc. **Conference on Neural Information Processing Systems (NeurIPS 2021)**, 2021.

15. A. Agafonov, P. Dvurechensky, **G. Scutari**, A. Gasnikov, D. Kamzolov, A. Lukashevich, and A. Daneshmand[+], "An Accelerated Second-Order Method for Distributed Stochastic Optimization," Proc. of the *60th IEEE Conference on Decision and Control (CDC)*, 14–17 Dec. 2021, Austin, TX, USA.

16. J. Xu[$], Y. Tian[+], Y. Sun[$], and **G. Scutari**, "Accelerated Primal-Dual Algorithms for Distributed Smooth Convex Optimization over Networks," Proc. **International Conference on Artificial Intelligence and Statistics (AISTATS 2020)**, 2020.

17. J. Xu[$], Y. Tian[+], Y. Sun[$], and G. Scutari[⋆], "A Unified Algorithmic Framework for Distributed Composite Optimization," Proc. of the *59th IEEE Conference on Decision and Control (CDC20)*, Dec. 14–18, 2020, (online conference because of COVID-19).

18. J. Xu[$], Y. Sun[$], Y. Tian[+], and G. Scutari[⋆], "A Unified Contraction Analysis of a Class of Distributed Algorithms for Composite Optimization," Proc. of the *2019 IEEE workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP19)*, Dec. 15–18, 2019, Guadeloupe, West Indies.