# Curriculum Vitae of J. Nicholas Laneman

## Contact Information

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## Summary

Dr. Laneman is Director of SpectrumX - An NSF Spectrum Innovation Center; Founding Director of the Wireless Institute in the College of Engineering; Professor in the Department of Electrical Engineering; Faculty Affiliate of iNDustry Labs; and Fellow of the Pulte Institute for Global Development as well as the Reilly Center for Science, Technology, and Values all at the University of Notre Dame. Laneman also served as Associate Chair and Director of Graduate Studies in the Department of Electrical Engineering from 2019-2022. He joined the faculty in August 2002 shortly after earning a Ph.D. in Electrical Engineering and Computer Science from the Massachusetts Institute of Technology (MIT). His research and teaching interests are in wireless system design, radio spectrum access, technology standards and intellectual property, and regulatory policy.

Laneman is a 2014 IEEE Fellow and received the 2018 IEEE Kiyo Tomiyasu Award. He received a 2006 Presidential Early-Career Award for Scientists and Engineers (PECASE) and a 2006 National Science Foundation (NSF) CAREER Award, in addition to three conference best paper awards. He has served as General Co-Chair of NSF Spectrum Week, the 2017 IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN), an Associate Editor for *IEEE Transactions on Communications*, and a Guest Editor for Special Issues of *IEEE Transactions on Information Theory* and *IEEE Journal on Selected Areas in Communications*. He was also the first Online Editor for the IEEE Information Theory Society and served on its Board of Governors.

Laneman is author or co-author on over 155 publications, including 47 journal articles and invited book chapters, and has been recognized by Thomson Reuters as an ISI Highly Cited Researcher (2010, 2015). He is co-inventor on eight U.S. patents, and has one patent pending. He currently advises six Ph.D. students; thirteen Ph.D. degrees, seventeen M.S. degrees, and one B.S. honors degree have been earned under his supervision. All of these research efforts have been supported in part by over $46M in funding, with Laneman serving as principal investigator on just over $36M.

## Professional Preparation

| | |
|---|---|
| 2002 | **Massachusetts Institute of Technology**, Cambridge, MA<br>Ph.D. in Electrical Engineering and Computer Science<br>*Thesis:* "Cooperative Diversity in Wireless Networks: Algorithms and Architectures" |
| 1997 | **Massachusetts Institute of Technology**, Cambridge, MA<br>S.M. in Electrical Engineering and Computer Science<br>*Thesis:* "Channel Estimation and Equalization for Spread-Response Precoding Systems" |
| 1995 | **Washington University**, St. Louis, MO<br>B.S. in Electrical Engineering, *summa cum laude*<br>B.S. in Computer Science, *summa cum laude* |

## Honors and Awards

| | |
|---|---|
| 2019 | Faculty Award, Qualcomm |
| 2019 | Outstanding Teacher Award, ND College of Engineering |
| 2018 | Kiyo Tomiyasu Award, IEEE |
| 2015 | ISI Highly Cited, Thomson Reuters |
| 2014 | Fellow, IEEE |
| 2011 | Best Paper Award, SDR WInnComm |
| 2010 | Best Paper Award, SDR WInnComm-Europe |
| 2010 | ISI Highly Cited, Thomson Reuters |
| 2009 | Best Demo Award, MobiHoc |
| 2008 | Best Paper Award, ISSSTA |
| 2008 | First Place, McClosky Business Plan Competition, ND |
| 2007 | Senior Member, IEEE |
| 2006 | Presidential Early-Career Award for Scientists and Engineers (PECASE) |
| 2006 | Faculty Early-Career Development (CAREER) Award, NSF |
| 2003 | Ralph E. Powe Junior Faculty Enhancement Award, ORAU |
| 2001 | EECS Department Harold L. Hazen Teaching Award, MIT |
| 1996–1999 | Graduate Research Fellowship, NSF |
| 1995 | School of Engineering Class Valedictorian, Washington University |

## Professional Experience

2026– **University of Notre Dame**, Notre Dame, IN
Wireless Institute, College of Engineering
*Title:* Director

2020– **University of Notre Dame**, Notre Dame, IN
iNDustry Labs
*Title:* Faculty Affiliate

2019– **University of Notre Dame**, Notre Dame, IN
Pulse Institute for Global Development
*Title:* Fellow

2019–2021 **University of Notre Dame**, Notre Dame, IN
Department of Electrical Engineering
*Title:* Associate Chair and Director of Graduate Studies

2016–2025 **University of Notre Dame**, Notre Dame, IN
Wireless Institute, College of Engineering
*Title:* Co-Director

2014– **University of Notre Dame**, Notre Dame, IN
Department of Electrical Engineering
*Title:* Professor

2012– **University of Notre Dame**, Notre Dame, IN
John J. Reilly Center for Science, Technology, and Values
*Title:* Fellow

2010–2016 **University of Notre Dame**, Notre Dame, IN
Wireless Institute, College of Engineering
*Title:* Founding Director

2008–2014 **University of Notre Dame**, Notre Dame, IN
Department of Electrical Engineering
*Title:* Associate Professor

2008–2009 **Rice University**, Houston, TX
Department of Electrical and Computer Engineering
*Title:* Texas Instruments Visiting Associate Professor

2002–2008 **University of Notre Dame**, Notre Dame, IN
Department of Electrical Engineering
*Title:* Assistant Professor

1995–2002 **Massachusetts Institute of Technology**, Cambridge, MA
Department of Electrical Engineering and Computer Science
*Title:* Research Assistant and Graduate Fellow

## Research Advising

*Ph.D. Theses Supervised (13)*

1. W. Zhang, "The Role of Channel Correlation in Fading Communication Channels," Ph.D. dissertation, University of Notre Dame, Notre Dame, IN, July 2006.
2. D. Chen, "Diversity and Spectral Efficiency in Wireless Relay Networks," Ph.D. dissertation, University of Notre Dame, Notre Dame, IN, Dec. 2007.
3. S. Kotagiri, "State-Dependent Networks with Side Information and Partial State Recovery," Ph.D. dissertation, University of Notre Dame, Notre Dame, IN, Dec. 2007.
4. B. P. Dunn, "Overhead in Communication Systems as the Cost of Constraints," Ph.D. dissertation, University of Notre Dame, Notre Dame, IN, Dec. 2010.
5. M. L. Dickens, "Surfer: Any-Core Software Defined Radio," Ph.D. dissertation, University of Notre Dame, Notre Dame, IN, Apr. 2012.
6. U. Kumar, "Feedback Coding Schemes for Control over Gaussian Networks," Ph.D. dissertation, University of Notre Dame, Notre Dame, IN, Sept. 2012, co-advised with Vijay Gupta.
7. Z. Sun, "Performance Metrics, Sampling Schemes, and Detection Algorithms for Wideband Spectrum Sensing," Ph.D. dissertation, University of Notre Dame, Notre Dame, IN, Dec. 2013.
8. M. Khoshnevisan, "Intermittent Communication," Ph.D. dissertation, University of Notre Dame, Notre Dame, IN, Jan. 2014.
9. G. J. Bradford, "Rate, Reliability, and Delay of Wireless Relays," Ph.D. dissertation, University of Notre Dame, Notre Dame, IN, Aug. 2014.
10. E. MolavianJazi, "A Unified Approach to Gaussian Channels with Finite Blocklength," Ph.D. dissertation, University of Notre Dame, Notre Dame, IN, Aug. 2014.
11. M. Cai, "Modeling and Mitigating Beam Squint in Millimeter Wave Wireless Communication," Ph.D. dissertation, University of Notre Dame, Notre Dame, IN, Mar. 2018.
12. H. Pezeski, "Anywhere Decoding: Low-Overhead Uplink Interference Management for Wireless Networks," Ph.D. dissertation, University of Notre Dame, Notre Dame, IN, Nov. 2018.
13. N. G. Kleber, "The Design of Widespread Spectrum Monitoring Systems," Ph.D. dissertation, University of Notre Dame, Notre Dame, IN, Apr. 2021.

*M.S. Theses Supervised (13)*

1. D. Chen, "Noncoherent Communication Theory for Cooperative Diversity in Wireless Networks," Master's thesis, University of Notre Dame, Notre Dame, IN, May 2004.
2. B. P. Dunn, "Delay Constrained Multimedia Communications: Comparing Source-Channel Approaches for Quasi-Static Fading Channels," Master's thesis, University of Notre Dame, Notre Dame, IN, Aug. 2005.

3. A. Crohas, "Practical Implementation of a Cognitive Radio System for Dynamic Spectrum Access," Master's thesis, University of Notre Dame, Notre Dame, IN, Aug. 2008.

4. G. J. Bradford, "A Framework for Implementation and Evaluation of Cooperative Diversity in Software-Defined Radio," Master's thesis, University of Notre Dame, Notre Dame, IN, Dec. 2008.

5. U. Kumar, "Network Communications with Feedback via Stochastic Approximation," Master's thesis, University of Notre Dame, Notre Dame, IN, Dec. 2009, co-advised with Vijay Gupta.

6. E. MolavianJazi, "Secure Communications over Arbitrarily Varying Wiretap Channels," Master's thesis, University of Notre Dame, Notre Dame, IN, Dec. 2009.

7. Z. Sun, "Design and Implementation of Sequence Detection Algorithms for Dynamic Spectrum Access," Master's thesis, University of Notre Dame, Notre Dame, IN, May 2010.

8. P. Hesami, "Low-Complexity Incremental Transmission for Multiple-Antenna Wireless Systems," Master's thesis, University of Notre Dame, Notre Dame, IN, Apr. 2011.

9. M. Khoshnevisan, "Optimal Power Allocation in Wireless Communications Subject to Several Power and Energy Constraints," Master's thesis, University of Notre Dame, Notre Dame, IN, Apr. 2011.

10. J. Masengesho, "Sequence Detection for Dynamic Spectrum Access," Master's thesis, University of Notre Dame, Notre Dame, IN, June 2012.

11. M. Cai, "Design and Implementation of a Distributed Spectrum Access System," Master's thesis, University of Notre Dame, Notre Dame, IN, Aug. 2014.

12. S. Golnarian, "Energy-Efficient and Queue-Aware Resource Allocation in Uplink OFDM Systems for Wireless M2M Communication," Master's thesis, University of Notre Dame, Notre Dame, IN, Dec. 2014.

13. N. G. Kleber, "Analysis of CSIR for an OFDM System Limited by a Frequency-Hopping Interferer," Master's thesis, University of Notre Dame, Notre Dame, IN, Dec. 2015.

*B.S. Honors Theses Supervised (1)*

1. R. L. Jones, III, "Measurements and Modeling of Primary User Activity for Dynamic Spectrum Access," Bachelor's thesis, University of Notre Dame, Notre Dame, IN, Apr. 2011.

## Current Research Assistants

*Graduate Students (6)*

Mr. Nazim Bicer (Ph.D., in progress)

Ms. Bingyan Lu (Ph.D., in progress)

Mr. Omkar Mujumdar (Ph.D., in progress)

Mr. Yankai Peng (M.S., in progress)

Mr. Zhiyu Shen (Ph.D., in progress)

Mr. Chris Wahl (Ph.D., in progress)

*Undergraduate Students (2)*

Ms. Solbee Kang (B.S., in progress)

Mr. Lucas Scholler (B.S., in progress)

## Past Research Assistants

*Post-Doctoral Scholars (2)*

Dr. Kambiz Azarian Yazdi (Ph.D., August 2006, Ohio State University; 2006–2007), now with Qualcomm

Dr. Matthieu Bloch (Ph.D., May 2008, Georgia Institute of Technology; 2008–2009), now faculty at Georgia Institute of Technology

*Graduate Students (20)*

Dr. Glenn Bradford (M.S., December 2008; Ph.D., August 2014), now with Myriota

Dr. Mingming Cai (M.S., August 2014; Ph.D., March 2018), now with Google

Dr. Deqiang Chen (M.S., May 2004; Ph.D., December 2007), now with Google

Ms. Alice Crohas (M.S., August 2008), now with Thoughtworks

Dr. Michael Dickens (Ph.D., May 2012), now an Independent Consultant

Dr. Brian Dunn (M.S., August 2005; Ph.D., December 2010), now with SpaceX

Mr. Sahand Golnarian (M.S., December 2014), now with Qualcomm

Mr. Peyman Hesami (M.S., May 2011), now with Spring Labs

Mr. Xiwen Kang (M.S., December 2021), now with Leidos

Dr. Mostafa Khoshnevisan (M.S., May 2011; Ph.D., January 2014), now with Qualcomm

Dr. Nikolas Kleber (M.S., December 2015; Ph.D. December 2020), now with Raytheon

Dr. Shivaprasad Kotagiri (Ph.D., December 2007), now with AMD

Dr. Utsaw Kumar (M.S., December 2009; Ph.D., August 2012), now with DoorDash

Mr. Joseph Masengesho (M.S., June 2012), now with Microsoft

Dr. Ebrahim MolavianJazi (M.S., December 2009; Ph.D., August 2014), now with Samsung Research

Dr. Hamed Pezeshki (Ph.D., November 2018) now with Qualcomm

Mr. Dawei Shen (M.S., May 2006), now with Bridgewater China

Dr. Zhanwei Sun (M.S., May 2010; Ph.D., December 2013), now with Meta

Mr. Guoyue Xu (M.S., December 2022)

Dr. Wenyi Zhang (M.S., May 2003; Ph.D., August 2006), now faculty at University of Science and Technology of China

## Publications

*Refereed Journal Articles (44)*

1. C.-E. W. Sundberg, D. Sinha, D. Mansour, M. Zarrabizadeh, and J. N. Laneman, "Multistream Hybid In Band On Channel FM Systems for Digital Audio Broadcasting," *IEEE Trans. Broadcast.*, vol. 45, no. 4, pp. 410–417, Dec. 1999.
2. J. N. Laneman and C.-E. W. Sundberg, "Soft Selection Combining for Terrestrial Digital Audio Broadcasting in the FM Band," *IEEE Trans. Broadcast.*, vol. 47, no. 2, pp. 103–114, June 2001.
3. J. N. Laneman and C.-E. W. Sundberg, "Reed-Solomon Decoding Algorithms for Digital Audio Broadcasting in the AM Band," *IEEE Trans. Broadcast.*, vol. 47, no. 2, pp. 115–122, June 2001.
4. J. N. Laneman, C.-E. W. Sundberg, and C. Faller, "Huffman Code Based Error Screening and Channel Code Optimzation for Error Concealment in Perceptual Audio Coding (PAC) Algorithms," *IEEE Trans. Broadcast.*, vol. 48, no. 3, pp. 193–206, Sept. 2002.
5. J. N. Laneman and G. W. Wornell, "Distributed Space-Time Coded Protocols for Exploiting Cooperative Diversity in Wireless Networks," *IEEE Trans. Inf. Theory*, vol. 49, no. 10, pp. 2415–2425, Oct. 2003.
6. J. N. Laneman, D. N. C. Tse, and G. W. Wornell, "Cooperative Diversity in Wireless Networks: Efficient Protocols and Outage Behavior," *IEEE Trans. Inf. Theory*, vol. 50, no. 12, pp. 3062–3080, Dec. 2004.
7. J. N. Laneman, E. Martinian, G. W. Wornell, and J. G. Apostolopoulos, "Source-Channel Diversity for Parallel Channels," *IEEE Trans. Inf. Theory*, vol. 51, no. 10, pp. 3518–3539, Oct. 2005.
8. W. Zhang and J. N. Laneman, "An Induced Additive-Noise Model for Non-Coherent Discrete-Time Memoryless Rayleigh Fading Channels," *IEEE Trans. Inf. Theory*, vol. 52, no. 4, pp. 1756–1764, Apr. 2006.
9. M. Sikora, J. N. Laneman, M. Haenggi, D. J. Costello, Jr., and T. E. Fuja, "Bandwidth- and Power-Efficient Routing in Linear Wireless Networks," *IEEE Trans. Inf. Theory*, vol. 52, no. 6, pp. 2624–2633, June 2006.
10. D. Chen and J. N. Laneman, "Modulation and Demodulation for Cooperative Diversity in Wireless Systems," *IEEE Trans. Wireless Commun.*, vol. 5, no. 7, pp. 1785–1794, July 2006.

11. A. Scaglione, D. Goeckel, and J. N. Laneman, "Cooperative Communications in Mobile Ad-Hoc Networks: Rethinking the Link Abstraction," *IEEE Signal Process. Mag.*, vol. 23, no. 5, pp. 18–29, Sept. 2006.

12. W. Zhang and J. N. Laneman, "How Good is Phase-Shift Keying for Peak-Limited Rayleigh Fading Channels in the Low-SNR Regime?" *IEEE Trans. Inf. Theory*, vol. 53, no. 1, pp. 236–251, Jan. 2007.

13. W. Zhang and J. N. Laneman, "Benefits of Spatial Correlation for Multi-Antenna Non-Coherent Communication over Fading Channels at Low SNR," *IEEE Trans. Wireless Commun.*, vol. 6, no. 3, pp. 887–896, Mar. 2007.

14. T. Wang, A. Cano, G. B. Giannakis, and J. N. Laneman, "High-Performance Cooperative Demodulation with Decode-and-Forward Relays," *IEEE Trans. Commun.*, vol. 55, no. 7, pp. 1427–1438, July 2007.

15. Özgür Oyman, J. N. Laneman, and S. Sandhu, "Multihop Relaying for Broadband Wireless Mesh Networks: From Theory to Practice," *IEEE Commun. Mag.*, vol. 45, no. 11, pp. 116–122, Nov. 2007.

16. S. Kotagiri and J. N. Laneman, "Multiple Access Channels with State Information Known to Some Encoders and Independent Messages," *EURASIP J. Wireless Comm. Net.*, vol. 2008, Feb. 2008.

17. D. Chen, K. Azarian, and J. N. Laneman, "A Case for Amplify-Forward Relaying in the Block-Fading Multiaccess Channel," *IEEE Trans. Inf. Theory*, vol. 54, no. 8, pp. 3728–3733, Aug. 2008.

18. M. L. Dickens, B. P. Dunn, and J. N. Laneman, "Design and Implementation of a Portable Software Radio," *IEEE Commun. Mag.*, vol. 46, no. 8, pp. 58–66, Aug. 2008.

19. D. Chen, M. Haenggi, and J. N. Laneman, "Distributed Spectrum-Efficient Routing Algorithms in Wireless Networks," *IEEE Trans. Wireless Commun.*, vol. 7, no. 12, pp. 5297 – 5305, Dec. 2008.

20. I. Krikidis, Z. Sun, J. N. Laneman, and J. Thompson, "Cognitive Legacy Networks via Cooperative Diversity," *IEEE Commun. Lett.*, vol. 13, no. 2, pp. 106–108, Feb. 2009.

21. W. Zhang, S. Kotagiri, and J. N. Laneman, "On Downlink Transmission Without Transmit Channel State Information and With Outage Constraints," *IEEE Trans. Inf. Theory*, vol. 55, no. 9, pp. 4240–4248, Sept. 2009.

22. I. Krikidis, J. N. Laneman, J. Thompson, and S. McLaughlin, "Protocol Design and Throughput Analysis for Multi-User Cognitive Cooperative Systems," *IEEE Trans. Wireless Commun.*, vol. 8, no. 9, pp. 4740–4751, Sept. 2009.

23. S. Kotagiri and J. N. Laneman, "Variations on Information Embedding in Multiple Access and Broacast Channels," *IEEE Trans. Inf. Theory*, vol. 56, no. 5, pp. 2225–2240, May 2010.

24. A. Zaidi, S. Kotagiri, J. N. Laneman, and L. Vandendorpe, "Cooperative Relaying with State Available Non-Causally at the Relay," *IEEE Trans. Inf. Theory*, vol. 56, no. 5, pp. 2272–2298, May 2010.

25. Z. Sun, G. J. Bradford, and J. N. Laneman, "Sequence Detection Algorithms for PHY-Layer Sensing in Dynamic Spectrum Access Networks," *IEEE J. Sel. Topics Signal Process.*, vol. 5, no. 1, pp. 97–109, Feb. 2011.

26. P. Hesami and J. N. Laneman, "Incremental Use of Multiple Transmitters for Low-Complexity Diversity Transmission in Wireless Systems," *IEEE Trans. Commun.*, vol. 60, no. 9, pp. 2522–2533, Sept. 2012.

27. P. Rost, G. Fettweis, and J. N. Laneman, "Energy- and Cost-Efficient Mobile Communication using Multi-Cell MIMO and Relaying," *IEEE Trans. Wireless Commun.*, vol. 11, no. 9, pp. 3377–3387, Sept. 2012.

28. M. L. Dickens, J. N. Laneman, and B. P. Dunn, "Seamless Dynamic Runtime Reconfiguration in a Sofware-Defined Radio," *J. Signal Process. Sys.*, vol. 69, no. 1, pp. 87–94, October 2012.

29. M. L. Dickens and J. N. Laneman, "On the Use of an Algebraic Language Interface for Waveform Definition," *Analog Integr. Circ. and Signal Process.*, vol. 73, no. 2, pp. 613–625, Nov. 2012.

30. M. Khoshnevisan and J. N. Laneman, "Power Allocation in MIMO Wireless Systems Subject to Simultaneous Power Constraints," *IEEE Trans. Commun.*, vol. 60, no. 12, pp. 3855–3864, Dec. 2012.

31. M. Bloch and J. N. Laneman, "Exploiting Partial Channel State Information for Secrecy over Wireless Channels," *IEEE J. Sel. Areas Commun.*, vol. 31, no. 9, pp. 1840–1849, Sept. 2013.

32. M. Bloch and J. N. Laneman, "Strong Secrecy from Channel Resolvability," *IEEE Trans. Inf. Theory*, vol. 59, no. 12, pp. 8077–8098, Dec. 2013.

33. U. Kumar, J. Liu, V. Gupta, and J. N. Laneman, "Improving Control Performance across AWGN Channels using a Relay Node," *Int. J. Syst. Sci.*, vol. 45, no. 7, pp. 1579–1588, July 2014.

34. U. Kumar, J. Liu, V. Gupta, and J. N. Laneman, "Stability Across a Gaussian Product Channel: Necessary and Sufficient Conditions," *IEEE Trans. Autom. Control*, vol. 59, no. 9, pp. 2530–2535, Sept. 2014.

35. Z. Sun and J. N. Laneman, "Performance Metrics, Sampling Schemes, and Detection Algorithms for Wideband Spectrum Sensing," *IEEE Trans. Signal Process.*, vol. 62, no. 19, pp. 5107–5118, Oct. 2014.

36. E. MolavianJazi and J. N. Laneman, "A Second-Order Achievable Rate Region for Gaussian Multi-access Channels via a Central Limit Theorem for Functions," *IEEE Trans. Inf. Theory*, vol. 61, no. 12, pp. 6719–6733, Dec. 2015.

37. M. Cai and J. N. Laneman, "Wideband Distributed Spectrum Sharing with Multichannel Immediate Multiple Access," *Analog Integr. Circ. and Signal Process.*, vol. 91, no. 2, pp. 239–255, May 2017.

38. M. Khoshnevisan and J. N. Laneman, "Intermittent Communication," *IEEE Trans. Inf. Theory*, vol. 63, no. 7, pp. 4089–4102, July 2017.

39. H. Pezeshki, M. Sadeghi, M. Haenggi, , and J. N. Laneman, "Anywhere Decoding: Low-Overhead Uplink Interference Management for Wireless Networks," *IEEE Trans. Wireless Commun.*, vol. 19, no. 6, pp. 4095–4108, June 2020.

40. N. Estes, K. Gao, B. Hochwald, J. N. Laneman, and J. Chisum, "Efficient Modeling of Low-Resolution Millimeter-Wave Transceivers for Massive MIMO Communication Systems," *Microwave and Optical Technology Letters*, vol. 63, no. 4, pp. 1134–1140, November 2020.

41. N. Kleber, M. Haenggi, J. Chisum, B. Hochwald, and J. N. Laneman, "Directivity in RF Sensor Networks for Widespread Spectrum Monitoring," *IEEE Trans. on Cogn. Commun. Netw.*, vol. 8, no. 2, pp. 778–792, June 2022.

42. N. Kleber, J. Chisum, B. Hochwald, and J. N. Laneman, "Three-Dimensional RF Sensor Networks for Widespread Spectrum Monitoring," *IEEE Trans. on Cogn. Commun. Netw.*, vol. 8, no. 2, pp. 763–777, June 2022.

43. K. Gao, X. Meng, J. N. Laneman, J. D. Chisum, R. Bendlin, A. Chopra, and B. M. Hochwald, "A Training-Based Mutual Information Lower Bound for Large-Scale Systems," *IEEE Trans. Commun.*, vol. 70, no. 8, pp. 5151–5163, Aug. 2022.

44. N. J. Estes, X. Kang, X. Meng, R. Bendlin, A. Chopra, J. N. Laneman, B. M. Hochwald, and J. D. Chisum, "A 0.71-mW Antenna-Coupled On–Off-Key Receiver for Gbps Millimeter-Wave Wireless Communications," *IEEE Trans. Microw. Theory Techn.*, vol. 71, no. 4, pp. 1793–1808, Apr. 2023.

*Book Chapters (3)*

1. J. N. Laneman, *Cooperation in Wireless Networks: Principles and Applications*. Springer, 2006, ch. Cooperative Diversity: Models, Algorithms, and Architectures, pp. 163–188.

2. A. Scaglione, D. Goeckel, and J. N. Laneman, *Distributed Antenna Systems: Open Architecture for Future Wireless Communications*. Auerbach Publications, CRC Press, 2007, ch. Cooperative Communications in Mobile Ad-Hoc Networks: Rethinking the Link Abstraction, pp. 87–116.

3. E. Hardouin, J. N. Laneman, S. Hidetoshi, A. Golitschek, and O. Gonsa, *LTE - The UMTS Long Term Evolution: From Theory to Practice*, Second ed. John Wiley and Sons, 2011, ch. Relaying.

*Refereed Conference Papers (71)*

1. J. N. Laneman and G. E. Peterson, "Real-Time Learning of Aircraft Parameters Using Recursive Least-Squares to Train RBF Networks," in *Proc. Artificial Neural Networks in Engineering (ANNIE)*, St. Louis, MO, Nov. 1996.

2. J. N. Laneman and G. W. Wornell, "Robust Equalization for Spread-Response Precoding Systems," in *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Seattle, WA, May 1998, pp. 3513–3516.

3. J. N. Laneman and G. W. Wornell, "Energy-Efficient Antenna Sharing and Relaying for Wireless Networks," in *Proc. IEEE Wireless Comm. and Networking Conf. (WCNC)*, Chicago, IL, Sept. 2000, pp. 7–12.

4. J. N. Laneman, G. W. Wornell, and D. N. C. Tse, "An Efficient Protocol for Realizing Cooperative Diversity in Wireless Networks," in *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Washington, DC, June 2001, p. 294.

5. J. N. Laneman and G. W. Wornell, "Distributed Space-Time Coded Protocols for Exploiting Cooperative Diversity in Wireless Networks," in *Proc. IEEE Global Comm. Conf. (GLOBECOM)*, Taipei, Taiwan, Nov. 2002, pp. 77–81.

6. J. N. Laneman, E. Martinian, G. W. Wornell, J. G. Apostolopoulos, and S. J. Wee, "Comparing Application- and Physical-Layer Approaches to Diversity on Wireless Channels," in *Proc. IEEE Int. Commun. Conf. (ICC)*, May 2003, pp. 2678–2682.

7. J. N. Laneman, "Limiting Analysis of Outage Probabilities for Diversity Schemes in Fading Channels," in *Proc. IEEE Global Comm. Conf. (GLOBECOM)*, San Francisco, CA, Dec. 2003, pp. 1242–1246.

8. J. N. Laneman and G. Kramer, "Window Decoding for the Multiaccess Channel with Generalized Feedback," in *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Chicago, IL, July 2004, p. 281.

9. J. N. Laneman, E. Martinian, and G. W. Wornell, "Source-Channel Diversity Approaches for Multimedia Communication," in *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Chicago, IL, July 2004, p. 393.

10. W. Zhang and J. N. Laneman, "Benefits of Correlated MIMO Schemes for Wideband Communication," in *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Chicago, IL, July 2004, p. 414.

11. M. Sikora, J. N. Laneman, M. Haenggi, D. J. Costello, Jr., and T. E. Fuja, "On the Optimum Number of Hops in Linear Ad Hoc Networks," in *Proc. IEEE Inform. Theory Workshop (ITW)*, San Antonio, TX, Oct. 2004, pp. 165–169.

12. J. N. Laneman, "Network Coding Gain of Cooperative Diversity," in *Proc. IEEE Military Comm. Conf. (MILCOM)*, Monterey, CA, Nov. 2004, pp. 106–112, invited paper.

13. D. Chen and J. N. Laneman, "Noncoherent Demodulation for Cooperative Diversity in Wireless Systems," in *Proc. IEEE Global Comm. Conf. (GLOBECOM)*, Dallas, TX, Nov. 2004, pp. 31–35.

14. W. Zhang and J. N. Laneman, "Recursive Training with Unitary Modulation for Correlated Block-Fading MIMO Channels," in *Proc. IEEE Workshop on Sig. Proc. Adv. in Wireless Comm. (SPAWC)*, New York, NY, June 2005, pp. 746–750.

15. C. T. K. Ng, J. N. Laneman, and A. Goldsmith, "The Role of SNR in Achieving MIMO Rates in Cooperative Systems," in *Proc. IEEE Information Theory Workshop (ITW)*, Punta del Este, Uruguay, Mar. 2006, pp. 288–292.

16. S. Kotagiri and J. N. Laneman, "Information Embedding in Degraded Broadcast Channels," in *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Seattle, WA, July 2006, pp. 494–498.

17. W. Zhang, S. Kotagiri, and J. N. Laneman, "Information Transmission over the Postal Channel with and without Feedback," in *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Seattle, WA, July 2006, pp. 2749–2753.

18. W. Zhang, S. Kotagiri, and J. N. Laneman, "Writing on Dirty Paper with Resizing and its Application to Quasi-Static Fading Broadcast Channels," in *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Nice, France, June 2007, pp. 381–385.

19. S. Kotagiri and J. N. Laneman, "Multiaccess Channels with State Information Known to One Encoder: A Case of Degraded Message Sets," in *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Nice, France, June 2007, pp. 1566–1570.

20. K. Azarian and J. N. Laneman, "Linear Space-Time Codes with Optimal Diversity-Multiplexing Tradeoff," in *Proc. IEEE Information Theory Workshop (ITW)*, Lake Tahoe, CA, Sept. 2007, pp. 483–486.

21. W. Chang, S. Kotagiri, J. N. Laneman, S.-Y. Chung, and Y.-H. Lee, "Compress-Forward Relaying over Parallel Gaussian Channels," in *Proc. Comp. Adv. Mult-Sensor and Adaptive Processing*, St. Thomas, US Virgin Islands, Dec. 2007, pp. 305–308.

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*Technical Reports (5)*

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## Regulatory Comments

1. "The National Spectrum Strategy Should Include Coordinated Research, Workforce Components," Submitted to the National Telecommunications and Information Administration (NTIA) National Spectrum Strategy Request for Comments, April 17, 2023. Available at: `https://www.ntia.gov/sites/default/files/publications/laneman.pdf`.

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3. SpectrumX Comments submitted to the NTIA National Spectrum Strategy Implementation Plan Request for Input, January 8, 2024. Available at: `https://www.ntia.gov/sites/default/files/comments-from-spectrumx.pdf`.

## Research Funding

*Active Grants and Contracts*

1. PI, National Science Foundation, $29,474,378 for "SII-Center: SpectrumX - An NSF Spectrum Innovation Center", 9/2021–8/2026 (with B. Hochwald)

2. co-PI, National Science Foundation, $1,500,000 for "Collaborative Research: CIRC: New: Spectrum Sharing Sandbox (S3) - A CBRS and 6 GHz Data Platform for Advancing Spectrum Coexistence", 6/2024–5/2027 (with M. Ghosh, A. Striegel, and P. Brenner)

3. PI, Rice University / National Science Foundation, $438,701 for "Collaborative Research: CIRC: GRAND: Houdini: Design and Development of a Open-Access very Diverse Spectrum Platform for Wireless Networking, Imaging and Sensing ", 6/2024–5/2029 (with B. Hochwald)

4. PI, Department of the Army, $648,520 for "IAC MAC SpectrumX Project: Spectrum Sharing Taxonomy", 1/2025-3/2026 (with M. Ghosh)

*Past Grants and Contracts*

1. Senior Personnel, Indiana Twenty-First Century Research and Technology Fund, $300,000 for "Indiana Center for Wireless Communications and Networking", 5/2003–5/2005 (with T. Fuja, D. Costello, and Y-F. Huang)

2. PI, Oak Ridge Associated Universities Ralph E. Powe Junior Faculty Enhancement Awards Program, $10,000 for "Source-Channel Diversity Methods for Wireless Communications", 6/2003–6/2004

3. co-PI, National Science Foundation, $299,993 for "SENSORS: Theory and Practice of Sensor Network Architectures", 9/2003–9/2006 (with M. Haenggi)

4. PI, University of Notre Dame, $9,177 for "Building 'Crystal Radio Sets' in Open-Source Software for Research, Education, and Outreach", 4/2005–3/2006

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9. PI, National Institute of Justice, $606,192 ($550,000 sponsor & $56,192 university cost-share) for "Software-Defined Radio Technologies for Justice and Public Safety Communications", 9/2006-9/2011

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12. co-PI, National Science Foundation, $150,000 for "SystemWare: Retooling Systems Instruction in Electrical Engineering", 1/2008–12/2009 (with T. Fuja and M. Haenggi)

13. co-PI, Department of Defense, $259,874 for "NDMesh: A Testbed for Experimental Research and Education on Wireless Mesh Networks", 4/2008–3/2009 (with C. Poellabauer and A. Striegel)

14. PI, Department of the Navy, $22,529 for "Software Tools for Power-Efficient Programming of Multi-Core Digital Signal Processors", 6/2009-4/2010 (subcontract through RFware LLC)

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17. PI, National Science Foundation, $381,155 for "CIF: Small: A Stochastic Approximation Approach to Network Communication with Feedback", 9/2009–8/2013 (with V. Gupta)

18. PI, National Science Foundation, $473,132 for "CCF: Small: Sensing-Based Dynamic Spectrum Access Networks: Modeling, Algorithms, & Experimental Validation", 9/2011–8/2014

19. co-PI, National Science Foundation, $1,192,000 ($1,000,000 sponsor & $192,000 university cost-share) for "CPS: Synergy: Resilient Wireless Sensor-Actuator Networks", 10/2012-9/2016 (with M. Lemmon and H. Lin)

20. PI, National Science Foundation, $14,554 for "Planning Grant: I/UCRC in Broadband Wireless Technologies and Applications", 3/2013–2/2014 (with B. Hochwald, A. Striegel, and M. Haenggi)

21. PI, National Science Foundation, $325,000 for "BWAC@NDWI: Broadband Wireless Access and Applications Center at the Notre Dame Wireless Institute", 8/2014–7/2019 (with B. Hochwald, T. Pratt, and A. Striegel)

22. PI, Alcatel-Lucent, $80,000 for "BWAC@NDWI Membership", 8/2014–7/2016 (with B. Hochwald, T. Pratt, and A. Striegel)

23. PI, InterDigital, $160,000 for "BWAC@NDWI Membership", 8/2014–7/2017 (with B. Hochwald, T. Pratt, and A. Striegel)

24. PI, Laboratory for Telecommunication Sciences, $154,961 for "BWAC@NDWI Membership", 8/2014–7/2016 (with B. Hochwald, T. Pratt, and A. Striegel)

25. PI, Office of Naval Research, $152,440 for "BWAC@NDWI Membership", 8/2014–7/2017 (with B. Hochwald, T. Pratt, and A. Striegel)

26. PI, Sprint, $40,000 for "BWAC@NDWI Membership", 8/2014–7/2015 (with B. Hochwald, T. Pratt, and A. Striegel)

27. PI, MIT Lincoln Laboratory, $85,029 for "Models, Theory, and Algorithms for Communication in the Presence of General Interference", 8/2014-8/2015

28. PI, National Instruments, $7,041 for "Wireless Innovation Workshop", 4/2015

29. co-PI, Huawei, $181,217 for "Research on Channel Estimation Technologies based on AoA/AoD in High Frequency Wireless Communication Systems", 6/2015–7/2016 (with B. Hochwald)

30. co-PI, IBM, $60,000 for "Wireless Stadium Research - Ad Hoc Video Pilot", 11/2015-4/2018 (with A. Striegel)

31. co-PI, Laboratory for Telecommunication Sciences, $187,124 for "Coherent RadioHound: A Distributed Spectrum Sensor Networks", 5/2016–9/2017 (with B. Hochwald)

32. co-PI, National Science Foundation, $650,000 for "Wideband Wireless Communications with Ultra-Efficient Transceiver-Cell Circuits", 8/2017–7/2021 (with B. Hochwald and J. Chisum)

33. Senior Personnel, National Science Foundation, $376,637 for "NDWI REU: Advanced Wireless Research Experiences (AWaRE)", 1/2018–12/2021 (with B. Hochwald and R. Billo)

34. PI, Dirac Solutions, $32,046 for "MIMO SDR Prototype for Interference-Limited Video Transmission", 8/2018–11/2018

35. PI, Office of Naval Research, $735,830 for "Improving STEM Pathways through Realistic Scenarios, Hands-On Implementation, and Red-Teaming: A Pilot Curriculum for Congested Communications and Electronic Warfare", 8/2018–8/2022 (with J. Chisum, B. Hochwald, and M. Kloser)

36. co-PI, AT&T Innovation Lab, $565,000 for "Ultra Low-Cost Low-Power Millimeter-Wave Transceiver", 9/2018–12/2024 (with B. Hochwald and J. Chisum)

37. co-PI, Office of Naval Research, $526,956 for "ROTC Cybersecurity Training at the University of Notre Dame", 1/2020–7/2022 (with P. Brenner)

38. PI, National Science Foundation, $300,000 for "SII Planning Grant: National Center for Radio Spectrum Innovations (NCRSI)", 8/2020-9/2021 (with B. Hochwald)

39. PI, National Science Foundation, $142,783 for "Conference: NSF Spectrum Week 2024", 7/2024-12/2024

40. PI, Economic Development Administration, $516,955 ($399,979 sponsor and $116,976 university cost-share) for "Midwest Wireless Innovation Hub (MWIH)", 1/2024–6/2025 (with M. Ghosh, B. Hochwald, J. Chisum, and P. Brenner)

*Industry Gifts*

1. NVIDIA Corporation, $25,000, April 2009
2. Qualcomm, $75,000, June 2019
3. Futurewei, $90,000, December 2019

*Proposals Submitted*

1. co-PI, Booz Allen Hamilton, $202,801 for "Advanced Dynamic Spectrum Sharing Demonstration (ADSSD)", 5/2025-7/2026 (with M. Ghosh)
2. PI, National Science Foundation, $1,331,000 for "SpectrumX - DCL GRS Fellowship and REU Supplement", 9/2025-8/2026 (with B. Hochwald)
3. co-PI, National Science Foundation, $899,984 for "VINES: Track 2: SAGE: Sensing-Aided and Fully-Automated Dynamic Spectrum Sharing for Agricultural Environments", 6/2026-5/2029 (with B. Hochwald)
4. PI, National Science Foundation, $5,000,000 for "Frameworks: Cyberinfrastructure for a Radio Science Coexistence Simulator (RSC-SIM) ", 7/2026-6/2031, with P. Brenner

## Presentations

*Tutorials and Short Courses*

1. "Theory and Strategies for Cooperative Communications", Three-hour tutorial at ISIT 2007, Nice, France (with G. Kramer)
2. "Communications Architecture for Wireless Relays: A Short Tutorial", One-hour tutorial at the Symposium on Information Theory in the Benelux 2009, Eindhoven, Netherlands

*Invited Seminars, Lectures, and Keynotes*

1. "Cooperative Diversity in Wireless Networks: Combating Multipath Fading using Multiple Protocol Layers"
    - Department of Electrical Engineering, University of Notre Dame, Notre Dame, IN, March 9, 2002
    - Department of Electrical Engineering, University of Missouri, Columbia, MO, April 4, 2002
    - Department of Electrical & Computer Engineering, University of Illinois, Urbana-Champaign, IL, May 1, 2002
2. "RF Communications 101: Combating Noise, Propagation Effects, and Interference", Institute for Defense Analysis (IDA), Alexandria, VA, March 14, 2003
3. "Source-Channel Diversity Approaches for Multimedia Communication"
    - Department of Electrical & Computer Engineering, The Ohio State University, Columbus, OH, February 3, 2004

- Department of Electrical & Computer Engineering, Northwestern University, Evanston, IL, February 11, 2004
- Department of Electrical & Computer Engineering, University of Toronto, Toronto, Canada, March 8, 2004
- Distinguished Seminar Series, Department of Electrical & Computer Engineering, University of Waterloo, Waterloo, Canada, March 9, 2004

4. "Cooperative Diversity in Wireless Networks: Algorithms and Architectures"

    - Coding & Signal Transmission Group, Department of Electrical & Computer Engineering, University of Waterloo, Waterloo, Canada, March 8, 2004
    - MIT Lincoln Laboratory, Lexington, MA, May 12, 2004

5. "Wireless Communications Architecture Research at Notre Dame", Philips Research USA, Briarcliff Manor, NY, June 9, 2005

6. "The Role of Temporal Correlation in Communication over Fading Channels: An Exploration from Low to High SNR"

    - Bell Labs, Lucent Technologies, Murray Hill, NJ, August 18, 2005
    - WINLAB, Rutgers University, Piscataway, NJ, August 19, 2005
    - Department of Electrical Engineering and Computer Science, Yale University, New Haven, CT, October 20, 2005

7. "Resurrecting Finite Blocklength Information Theory for Analysis and Design of Wireless Network Architectures", Distributed Communications Group, Intel Research, Santa Clara, CA, April 15, 2006

8. "State-Dependent Multiaccess Channels with Some Informed Encoders", Department of Electrical and Computer Engineering, Rice University, Houston, TX, April 5, 2007

9. "Wireless Relays: From Multihop to Cooperative Diversity",

    - Cooperative Wireless Networks Workshop, Intel Research, Santa Clara, CA, April 12, 2006
    - Departmento de Ciência de Computadores, Universidade do Porto, Porto, Portugal, June 15, 2007
    - Centre Tecnologic de Telecomunicacions de Catalunya (CTTC), Barcelona, Spain, July 20, 2007
    - Fakultät für Elektrotechnik und Informationstechnik, Technischen Universität München (TUM), München, Germany, July 24, 2007
    - Broadband Communications and Wireless Systems (BCWS) Centre, Department of Systems and Computer Engineering, Carleton University, Ottawa, Canada, September 21, 2007
    - Research Seminar on Smart Antennas and Cooperative Communications, The Institution of Engineering and Technology, London, United Kingdom, October 22, 2007

10. "Asymmetry in State-Dependent Networks"

- Départment d'Électricité, Université Catholique de Louvain, Louvain-La-Neuve, Belgium, July 12, 2007
- Faculté Informatique et Communications, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland, July 16, 2007
- Departement Informationstechnologie und Elektrotechnik, Eldgenössische Technische Hochschule (ETH), Zürich, Switzerland, July 26, 2007

11. "RadioWare: Four Years of 'Software Radio' and Applications", Microsoft Research Cognitive Wireless Networking Summit, Seattle, WA, June 5, 2008

12. "Interoperable Communications Technology and Policy", Harvard Kennedy School Executive Session on Policing, Cambridge, MA, June 20, 2008

13. "Communications Architecture for Wireless Relays", iCORE Wireless Research Laboratory, Department of Electrical and Computer Engineering, University of Alberta, Edmonton, Canada, February 6, 2009

14. "Information Theory and Secure Communications Architecture"

    - Department of Electrical and Systems Engineering, Washington University, St. Louis, MO, February 27, 2009
    - Signals, Information, and Algorithms (SIA) Laboratory, Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, Cambridge, MA, April 6, 2009
    - Division of Engineering and Applied Sciences, Harvard University, Cambridge, MA, April 9, 2009
    - Center for Information Science and Engineering (CISE), Department of Electrical and Computer Engineering, Boston University, Boston, MA, April 10, 2009
    - Department of Electrical and Computer Engineering, Texas A&M University, College Station, TX, April 14, 2009
    - Department of Electrical and Computer Engineering, University of Texas, Austin, TX, May 1, 2009
    - Forschungszentrum Telekommunikation Wien (FTW), Vienna Austria, June 3, 2009

15. "Relays Diversified", Edward van der Meulen Seminar on Relay Communication, Technische Universiteit Eindhoven, Eindhoven, Netherlands, May 27, 2009

16. "Experimental / Applied Wireless Research with Software-Defined Radio", Fort Wayne Wireless School, Indiana University-Purdue University Fort Wayne (IPFW), Fort Wayne, IN, June 18, 2009

17. "The Importance of Communications Architecture", Fakultät für Elektrotechnik und Informationstechnik, Technischen Universität München (TUM), München, Germany, November 5, 2009

18. "Sequence Detection Algorithms for Spectrum Sensing in Wireless Networks with Dynamic Spectrum Access"

- Department of Electrical and Computer Engineering, Boston University, Boston, MA, April 22, 2010
- Department of Electrical and Systems Engineering, University of Pennsylvania, Philadelphia, PA, March 15, 2011
- Department of Electrical and Computer Engineering, Purdue University, West Lafayette, IN, November 10, 2011
- Department of Electrical and Systems Engineering, Washington University, St. Louis, MO, March 16, 2012
- Department of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA, November 12, 2012
- MIT Lincoln Laboratory, Lexington, MA, April 25, 2013

19. "Perspectives on Wireless Innovation in Academia", College of Engineering, Auburn University, Auburn, AL, August 25, 2014

20. "The Notre Dame Wireless Institute", Department of Electrical and Information Technology, Lund University, Lund, Sweden, September 28, 2015

21. "Navigating 3GPP Standards", Wireless Institute, University of Notre Dame, Notre Dame, IN, January 22, 2019

22. "RadioHound: RadioHound: A Low-Cost Platform for Widespread Spectrum Sensing and Monitoring", Futurewei University Days, Chicago, IL, August 8, 2019

23. "Overview of SpectrumX - The First NSF Spectrum Innovation Center"

    - Wireless Spectrum Research and Development (WSRD) Interagency Working Group, October 7, 2021
    - Wireless Innovation Forum, October 21, 2021
    - Keynote at WInnComm, December 2, 2021
    - Futurewei University Days, August 4, 2022
    - NextG Alliance Spectrum Working Group, September 15, 2022
    - National Academies of Science, Engineering, and Medicine (NASEM) Committee on Radio Frequencies (CORF), November 9, 2022

24. "Advancing Spectrum Sensing, Big Data, and Coexistence through SpectrumX and ND Wireless", Keynote at IEEE Int. Symposium Dynamic Spectrum Access Networks (DySPAN), December 15, 2021

25. "SpectrumX Testbeds and Capabilities for Spectrum Sharing", Wireless Spectrum Research and Development (WSRD) Interagency Working Group, May 11, 2022

26. "Teaming Up to Advance Monitoring and Sharing of the Radio Frequency Spectrum", IEEE Int. Communications Conf. (ICC) Workshop on Spectrum Sharing Technology for Next-Generation Communications, May 15, 2022

27. "Career Opportunities in Radio Spectrum Innovation"
    - Department of Electrical and Computer Engineering, Florida International University, September 23, 2022
    - Department of Electrical and Computer Engineering, Valparaiso University, September 26, 2022
    - Department of Electrical and Computer Engineering, Rose-Hulman Institute of Technology, October 17, 2022
    - Department of Electrical and Computer Engineering, Brigham Young University, October 20, 2022
    - Olin College of Engineering, December 6, 2022
28. "Twenty Years of Utilizing Software-Defined Radio in University Research, Teaching, and Collaboration: From a Single USRP Beta to SpectrumX", Keynote at GNU Radio Conference (GRCon), September 29, 2022
29. "Expanding Wireless Connectivity Regionally and Nationally through Shared Spectrum", IEEE Connected the Unconnected (CTU) Summit, November 3, 2022
30. "Towards a New Kind of Radio Spectrum Understanding and Management", Keynote at New England Workshop on Software-Defined Radio (NewSDR), May 30, 2025

*Invited Panel Sessions*

1. National Telecommunications and Information Administration (NTIA) Spectrum Policy Symposium Panel on "Expediting and Improving Spectrum-Sharing Processes," September 21, 2021
2. NextG Alliance Panel on "Driving 6G Research Priorities", Virtual, February 17, 2022
3. MetroLab Summit Panel on "Tapping into Spectrum: A new form of hotspots in South Bend", University of Chicago, June 2, 2022
4. RFDataFactory Workshop Panel on "Building Public Trust and Confidence", Northeastern University, June 7, 2022
5. Silicon Flatirons Spectrum Policy Panel on "Technical, Economic, and Regulatory Solutions to Interference Conflicts", University of Colorado, October 7, 2022
6. 6G World 6G Symposium Panel on "Building Blocks of the Experience: Research", October 11, 2022
7. National Spectrum Consortium (NSC) Spectrum Innovation Summit Panel on "Requirements for the Spectrum Workforce of the 21st Century", November 8, 2022
8. NYU / Nokia / IEEE Brooklyn 6G Summit Panel on "Regulatory Landscape of 6G", November 1, 2023
9. NTIA Spectrum Policy Symposium Panel on "Growth of the Spectrum Workforce, Increased Understanding of Spectrum, and Raised Awareness of Spectrum's Importance to the Country", February 2, 2024

10. NTIA International Symposium on Advanced Radio Technologies (ISART) Panel on "In Pursuit of Consensus on Clutter: Openness, Collaboration, and Growing the Community", June 13, 2024 (Moderator)

11. IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN) Panel on "International Models for Aligning Spectrum R&D with the Needs of Policymakers and Regulators", May 12, 2025

12. NYU / Nokia / IEEE Brooklyn 6G Summit Panel on "US Academic View of 6G", November 5, 2025

13. The Marconi Society Advanced Wireless Forum Panel on "Spectrum Issues", November 13, 2025

*Conference Presentations and Demonstrations*

1. D. Chen and J. N. Laneman, "Achieving the Diversity-Multiplexing Tradeoff of the Multi-Access Relay Channel," in *MSRI Workshop on Mathematics of Relaying and Cooperation in Wireless Networks*, Berkeley, CA, Apr. 2006.

2. D. Chen and J. N. Laneman, "Diversity and Multiplexing in Multiuser Relay Channels," in *Proc. IEEE Comm. Theory Workshop*, Dorado, Puerto Rico, May 2006, invited presentation.

3. J. N. Laneman and J. Barros, "Rate-Equivocation Tradeoffs for General Eavesdropper Channels," in *Proc. Workshop on Information Theory and its Applications (ITA)*, San Diego, CA, Jan. 2007, invited presentation.

4. G. J. Bradford, B. P. Dunn, M. L. Dickens, Z. Sun, and J. N. Laneman, "Demonstration of Cooperative Diversity using a Custom Software-Defined Radio Prototype," in *Proc. ACM Int. Symp. on Mobile Ad Hoc Net. and Comp. (MobiHoc)*, New Orleans, LA, May 2009.

5. P. Rost, G. Fettweis, and J. N. Laneman, "Broadcast and Interference in Relay-Assisted Next-Generation Cellular Systems," in *Proc. IEEE Comm. Theory Workshop*, Napa Valley, CA, May 2009.

6. Z. Sun, G. J. Bradford, and J. N. Laneman, "Demonstration of Sequence Detection Algorithms for Dynamic Spectrum Access Networks," in *Proc. IEEE Int. Dynamic Spectrum Access Networks (DySPAN) Symp.*, Singapore, Apr. 2010.

7. H. Pezeshki and J. N. Laneman, "Demonstration of a Prototype Uplink Muliuser MIMO System in IEEE 802.11ax," in *Proc. IEEE Global Comm. Conf. (GLOBECOM)*, Washington, DC, Dec. 2016.

8. N. Kleber, A. Termos, G. Martinez, J. Merritt, B. Hochwald, J. Chisum, A. Striegel, and J. N. Laneman, "RadioHound: A Pervasive Sensing Platform for Sub-6 GHz Dynamic Spectrum Monitoring," in *Proc. IEEE Int. Dynamic Spectrum Access Networks (DySPAN) Symp.*, Baltimore, MD, Mar. 2017.

## Course Instruction and Development

Courses marked with "*" were either newly created or underwent significant development.

EE-563 – Random Variables and Stochastic Processes
Fall 2002

EE-698G / 87005 – Advanced Topics in Multiuser Communications *
Spring 2003, Fall 2006

EE-60563 – Random Vectors, Detection, & Estimation *
Fall 2003, Fall 2004

EE-30344 – Signals & Systems
Fall 2020

EE-354 / 30354 – Signals & Systems II
Spring 2004, Spring 2005, Spring 2006, Spring 2007

SC-190 – University Seminar on Nanotechnology
Guest Lecturer, Fall 2004

EE-80653 – Information Theory *
Fall 2005, Fall 2009, Fall 2015

EE-87109 – Advanced Topics in Information Theory *
Fall 2007

EE-60573 – Random Processes, Detection, and Estimation *
Spring 2008, Spring 2013, Spring 2023

EE-60553 – Advanced Digital Communications *
Spring 2010, Spring 2011, Spring 2014, Spring 2015, Spring 2019, Spring 2021, Spring 2025

ESTS/BAUG-40402 – Wireless Communications Survey *
Spring 2010, Spring 2012

EE-40453/30023 – Communication Systems *
Fall 2010, Fall 2011, Fall 2012, Spring 2016, Spring 2017, Spring 2018, Spring 2020, Spring 2022, Spring 2024, Spring 2026

EE-63001 – Introduction to Research in Communications, DSP, and Control
Fall 2016

EE-87029 – Advanced Topics in Wireless Communications *
Fall 2013

EG-10111 – Introduction to Engineering Systems I
Fall 2017, Fall 2018, Fall 2019

PCSE-00259 – Engineering and Inventing the Future: Making Things Smarter for a Better World
Summer 2022, Summer 2023, Summer 2024

## Professional Service

Advisory Committees and Boards:

NextG Alliance Research Council, 2022–present

Government Liaison:

National Telecommunications and Information Administration (NTIA) Institute for Telecommunication Sciences (ITS) Liaison, 2022–present

Officer: IEEE Information Theory Society Board of Governors, 2011–2016
IEEE Information Theory Society Online Editor, 2006–2010

Assoc. Editor: *IEEE Trans. on Commun.* for "Cooperative Diversity", 7/2008–6/2011

Guest Editor: *IEEE Trans. on Information Theory* Special Issue on Models, Theory and Codes for Relaying and Cooperation in Communication Networks, October 2007

*IEEE Journal on Selected Areas in Communications* Special Issue on Cooperative Communications and Networking, February 2007

Conference Chairman:

NSF Spectrum Week, Arlington, VA 2024
NSF Spectrum Week, Alexandria, VA 2023
IEEE DySPAN, Baltimore, MD, April 2017

Workshop Organizer and Chair:

National Radio Science Meeting (NRSM) Workshop on Spectrum Management and Innovation for Radio Scientists, January 7, 2025
High-Dimensional, Low-Resolution Architectures for Power-Efficient Wireless Communications, IEEE Global Communications Conference (GLOBECOM), Waikoloa, HI, December 13, 2019
Mathematical Science Research Institute (MSRI) Workshop on Mathematics of Relaying and Cooperation in Communication Networks, Berkeley, CA, April 10-12, 2006

Organizing Committee Member:

IEEE DySPAN 2024, Washington, DC, 2024

Technical Program Committee Member:

Int. Symp. Adv. Radio Technologies (ISART), Denver, CO 2024
IEEE DySPAN 2018, Seol, South Korea, 2018
IEEE DySPAN 2015, Stockholm, Sweden, 2015
IEEE Workshop on Shared Spectrum Access for Radar and Communications (SSPARC), McLean, VA, 2014
IEEE Information Theory Workshop, Seville, Spain, 2013
IEEE Global Commun. Conf. (GLOBECOM), Anaheim, CA, 2012
IEEE Int. Commun. Conf. (ICC), Ottawa, 2012
IEEE Information Theory Workshop (ITW), Paraty, 2011
Int. Conf. Cognitive Radio Oriented Wireless Networks and Commun. (CrownCom), Hannover, 2009
IEEE Information Theory Workshop (ITW), Taormina, 2009
Symp. Model. & Opt. Mob. Ad-Hoc Wireless Net. (WiOpt), Seoul, 2009

IEEE Int. Symp. Inform. Theory (ISIT), Seoul, 2009
IEEE Int. Commun. Conf. (ICC), Dresden, 2009
IEEE Int. Symp. Inform. Theory (ISIT), Toronto, 2008
Symp. Model. & Opt. Mob. Ad-Hoc Wireless Net. (WiOpt), Berlin, 2008
IEEE Global Commun. Conf. (GLOBECOM), Washington, DC, 2007
IEEE Int. Conf. Wireless Net. & Comm. (WirelessCom), Vancouver, 2006
IEEE Wireless Commun. and Net. Conf. (WCNC), Las Vegas, 2006
IEEE Int. Conf. Wireless Net. & Commun. (WirelessCom), Maui, 2005
IEEE Signal Proc. Apps. for Wireless Commun. (SPAWC), New York, 2005

Session Organizer and Chair:

IEEE Information Theory Workshop (ITW), "Cooperative Wireless Networks", Taormina, 2009
IEEE Int. Workshop on Comp. Adv. in Multi-Sensor Adaptive Proc. (CAMSAP), "Distributed Signal Processing", St. Thomas, 2007
Asilomar Conf. on Signals, Systems, and Computers, "Cooperative Diversity", Monterey, 2007
IEEE Int. Symp. Inform. Theory (ISIT), "Recent Results", Seattle, 2006
IEEE Int. Symp. Inform. Theory (ISIT), "Recent Results", Seattle, 2006
IEEE Int. Workshop on Comp. Adv. in Multi-Sensor Adaptive Proc. (CAMSAP), "Cooperative Sensor Networks", Puerto Vallarta, 2005

Reviewer:

*EURASIP Journal on Communications and Networking*
*European Transactions on Telecommunications*
*IEEE Communications Letters*
*IEEE Communications Magazine*
*IEEE Journal on Selected Areas in Communications*
*IEEE Signal Processing Letters*
*IEEE Transactions on Automatic Control*
*IEEE Transactions on Circuits and Systems II*
*IEEE Transactions on Communications*
*IEEE Transactions on Information Theory*
*IEEE Transactions on Signal Processing*
*IEEE Transactions on Vehicular Technology*
*IEEE Transactions on Wireless Communications*
*NOW Foundations and Trends in Networking*
*Proceedings of the IEEE*
*The Computer Journal*
*Elec. Telecomm. Res. Inst. (ETRI) Journal*
*IEEE Int. Symp. on Model., Anal., & Sim. of Wireless and Mob. Sys. (MSWiM)*
*IEEE Global Communications Conference (GLOBECOM)*
*IEEE Infocom*
*IEEE Information Theory Workshop (ITW)*
*IEEE Int. Communications Conf. (ICC)*
*IEEE Int. Conf. on Acoustics, Speech, & Sig. Proc. (ICASSP)*
*IEEE Int. Conf. on Wireless Net. & Comm. (WIRELESSCOM)*

*IEEE Int. Symp. on Information Theory (ISIT)*
*IEEE Military Communications Conf. (MILCOM)*
*IEEE Workshop on Sig. Proc. Adv. in Wireless Comm. (SPAWC)*
*IEEE Vehicular Technology Conf. (VTC)*
*IEEE Wireless Communications & Networking Conf. (WCNC)*
*Int. Conf. on Broadband Networks (BROADNETS)*

Committee Member:
IEEE Information Theory Society James L. Massey Award Committee, 2015–2016
IEEE Information Theory Society External Nominations Committee, 2015
IEEE Information Theory Society Membership and Chapters Committee, 2011–2014
IEEE Information Theory Society Online Committee, 2007–2016
IEEE Information Theory Society Chapter Award Sub-Committee, 2006, 2011, 2012

Panelist: Army Research Office Reviewer
National Institute of Justice Scientific Review Panel
National Science Foundation Panelist

Member: Institute of Electrical and Electronics Engineers (IEEE)
IEEE Information Theory Society
IEEE Communications Society
IEEE Signal Processing Society

## Academic Service

*University*

Provost Faculty Fellow, 2012–2014
Faculty Digital Learning Steering Committee, 2014–2016
Faculty Advisory Board, Hesburgh Program in Public Service, 2012–2015
Committee on Multi-Disciplinary Research, 2011–2013
Committee on Research and Sponsored Programs, 2010–2013

*College of Engineering*

Computing Committee, 2007–2013
College Council, 2018–2021, 2024–present

*Department of Electrical Engineering*

Associate Chair and Director of Graduate Studies, 2019–2021
Appointments and Promotions Committee, 2014–2015
Chair Recommendation Committee, 2026 Communications Committee, 2021–present
Computing Committee, 2003–present
Faculty Search Committee, 2009–2010, 2020–2021
Graduate Admissions Committee, 2002–2003, 2006–2007, 2012–2013, 2018–2019
Graduate Committee, 2006–2008, 2013–2015, 2023–2025
IEEE Student-Branch Advisor, 2003–2008

Undergraduate Committee, 2003–2005, 2007–2008, 2009–2011, 2015–2017, 2018–2019, 2022–2024, 2025–present
Undergraduate Advising / Sophomore Mentor, 2003–2006, 2018–2019, 2025–present