

# Joseph D. Camp

## CONTACT INFORMATION

Southern Methodist University  
ECE Department, Junkins Building  
6251 Airline Rd. #340  
Dallas, Texas 75205 USA

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## RESEARCH INTERESTS

Wireless systems and drone communications, specifically building real systems at-scale and analyzing the performance within representative environments.

## EDUCATION

**Rice University**, Houston, Texas USA

Ph.D., Electrical and Computer Engineering, May 2009

- Dissertation: “Experimental and Analytical Evaluation of Embedded Link Performance with Small-Scale Channel Fluctuations” (Best Engineering Thesis 2010)
- Advisor: Professor Edward W. Knightly

M.S., Electrical and Computer Engineering, January 2006

- Thesis: “Measurement Driven Deployment of a Two-Tier Urban Mesh Access Network”
- Advisor: Professor Edward W. Knightly

**The University of Texas at Austin**, Austin, Texas USA

B.S. with Honors, Electrical and Computer Engineering, May, 2003

## POSITIONS

Southern Methodist University, 9/2021-present. *Professor.*

Southern Methodist University, 9/2015-8/2021. *Associate Professor.*

Southern Methodist University, 10/2009-8/2015. *J. Lindsay Embrey Trustee Professor.*

Southern Methodist University, 7/2009-8/2015. *Assistant Professor.*

## HONORS AND AWARDS

Gerald J. Ford Research Fellowship (2021)

Golden Mustang Teaching Award (2014)

NSF CAREER Award (2012)

Ralph Budd Award for Best Engineering Thesis at Rice University (2010)

SMU Provost Instructional Grant (2009)

NSF Travel Grant for ACM MobiCom (2008)

Rice Presidential Fellowship (August 2003 to May 2009)

First Place in Advanced Micro Devices/Rice VLSI Design Contest (2004)

Outstanding Intel Intern (2000 and 2002)

University of Texas Scholarships (1998): Terry Foundation, Jesse H. Jones (Houston Endowment), Texas Engineering Foundation, University of Texas Exes, Houston Northwest Chamber of Commerce, Cy-Fair Federal Credit Union, BankOne

Salutatorian (2/460) and Senior Class President of Cy-Fair High School (1998)

## GRANTS AND CONTRACTS AWARDED

2020, “PAWR Platform Full proposal: NEXTT: Nebraska Experimental Testbed of Things”

**SMU PI, NSF (PAWR Program Finalist - Planning Grant)**, PI: Mehmet Can Vuran, \$300,000 total

2019-2022, “CNS Core: Small: Collaborative Research: Many-Antenna Full-Duplex for Mobile and Multi-hop Topologies”  
**SMU PI, NSF (CNS Core Program)**, \$250,000, PI: Ehsan Aryafar (Portland State University), \$500,000 total

2019-2022, “On-the-Fly Topological Formation of Drone Swarms”  
**PI, AFOSR (DDDAS Program)**, co-PI: Dinesh Rajan, \$225,055

2019, “REU Supplement: Channel Recognition for Optimized Links And Networks (CROLA)”  
**PI, NSF REU Program**, \$16,000

2018-2023, “Radiation Background Characterization for Advanced Anomaly Detection”  
**co-PI, DHS (DNDO Program)**, PI: Bruce Gnade \$1,505,787

2018-2021, “II-New: Multi-Dimensional Drone Communication Infrastructure (MuDDI)”  
**PI, NSF (NeTS CISE CRI Program)**, co-PI: Dinesh Rajan \$849,839

2015-2018, “NeTS: Small: Channel Recognition for Optimized Links And Networks (CROLA)”  
**PI, NSF (NeTS/CNS Program)**, co-PI: Dinesh Rajan \$460,000

2016, “I-Corps: Efficient Terrain-Based Measurement Gathering for Path Loss Inference”  
**PI, NSF (I-Corps Program)**, \$50,000

2015, “Student Travel Support for the IEEE SECON 2015 Conference”  
**PI, NSF (NeTS/CNS Program)**, \$15,000

2013-2016, “NeTS: Small: Collaborative Research: Theory, Algorithms, and Experiments for Frequency-Agile Beamforming Mesh (FabMesh)”  
**PI, NSF CNS NeTS**, Co-PI: Mung Chiang (Princeton University), \$498,000

2012-2017, “CAREER: Leveraging Simultaneous Access to Multiple Frequency Bands in Multihop Wireless Networks”  
**PI, NSF CAREER Program**, \$450,000

2012-2013, “REU Supplement: Dallas-Area Testbed for Context-Aware, Cognitive Research (DART-CARs)”  
**PI, NSF REU Program**, Co-PI: Dinesh Rajan, \$16,000

2010-2013, “MRI Consortium: Development of Wireless Networking Testbed and Emulator (WiNeTestEr)”  
**co-PI, NSF Award (MRI Program)**, PIs: Ravi Prakash and Dinesh Rajan, \$985,958

2010-2012, “Context-Aware, Resilient, and Scalable Architectures for Multi-Band Vehicular Networks”  
**co-PI, Contract with Toyota InfoTechnology Center**, PI: Dinesh Rajan, \$125,000

2010-2013, “CRI/II-New: Dallas-Area Testbed for Context-Aware, Cognitive Research (DART-CARs)”  
**PI, NSF Award (CRI Program)**, Co-PI: Dinesh Rajan, \$535,000 (over 3 annual increments)

2010-2013, “Adaptive Filter-Bank Modulation for Ubiquitous Landline-Based Broadband Access”  
**co-PI, SBIR Award with XtendWave, Inc.**, PI: Dinesh Rajan, \$22,802

2010-2011, “Transceiver Techniques for Multiband Communications over Wired Channels”  
**co-PI, Contract with XtendWave, Inc.**, PI: Dinesh Rajan, \$8,925

#### JOURNAL ARTICLES

Y. Shi, M. Badi, D. Rajan, and J. Camp. “Channel Reciprocity Analysis and Feedback Mechanism Design

for Mobile Beamforming Systems,” to appear in *IEEE Transactions on Vehicular Technology*, 2021.

R. Enami, S. Gupta, D. Rajan, and J. Camp. “LAIK: Location-Specific Analysis to Infer Key Performance Indicators,” to appear in *IEEE Transactions on Vehicular Technology*, 2021.

M. Badi, J. Wensowitch, D. Rajan, and J. Camp. Experimentally Analyzing Diverse Antenna Placements and Orientations for UAV Communications, in *IEEE Transactions on Vehicular Technology*, 69(12):14989-15004, December 2020.

H. Liu, J. He, S. Gupta, D. Rajan, and J. Camp. FIT: On-the-Fly, In-Situ Training for SNR-Based Rate Selection, in *IEEE Transactions on Vehicular Technology*, 69(10):11295-11307, October 2020.

G. Dvorocsik, E. Sarris, and J. Camp. “Using Clustering to Find Pitch Subtypes and Effective Pairings,” in *SABR Baseball Research Journal*, 2020.

P. Huang, M. Tonnemacher, Y. Du, D. Rajan, and J. Camp. “Towards Massive MIMO Channel Emulation: Channel Accuracy Versus Implementation Resources,” in *IEEE Transactions on Vehicular Technology*, 69(5):4635-4651, May 2020.

H. Liu, J. He, J. Wensowitch, D. Rajan, and J. Camp. “Architecture and Experimental Evaluation of Context-Aware Adaptation in Vehicular Networks,” in *EURASIP Journal on Wireless Communications and Networking*, 2020.

M. Tonnemacher, C. Tarver, V. Chandrasekhar, H. Chen, P. Huang, B.L. Ng, J. Zhang, J. Cavallaro, and J. Camp. “Enabling a “Use-or-Share” Framework for PAL-GAA sharing in CBRS Networks via Reinforcement Learning,” in *IEEE Transactions on Cognitive Communications and Networking*, 5(3):716-729, September, 2019.

Y. Du, P. Huang, Y. Shi, D. Rajan, and J. Camp. “Design of Coherence-Aware Channel Indication and Prediction for Rate Adaptation,” in *EURASIP Journal on Wireless Communications and Networking*, 2019.

P. Cui, S. Chen, and J. Camp. “GreenLoading: Using the Citizens Band Radio for Energy-Efficient Offloading of Shared Interests,” in *Elsevier Computer Communications Journal*, August, 2019. [4+ citations (Google Scholar)]

Y. Du, Y. Shi, E. Aryafar, P. Cui, J. Camp, and M. Chiang. “SAMU: Design and Implementation of Selectivity-Aware MU-MIMO for Wideband WiFi,” in *EURASIP Journal on Wireless Communications and Networking*, December 2018 2018: 297. <https://doi.org/10.1186/s13638-018-1310-3>. [20+ citations (Google Scholar)]

R. Enami, Y. Shi, D. Rajan, and J. Camp. “Pre-Crowdsourcing: Predicting Wireless Propagation with Phone-Based Channel Quality Measurements,” in *Elsevier Computer Communications Journal*, 132:96-110, October, 2018. <https://doi.org/10.1016/j.comcom.2018.10.003> [5+ citations (Google Scholar)]

Y. Shi and J. Camp. “Downlink Resource Allocation for Enhanced Inter-Cell Interference Coordination (eICIC) in Heterogeneous Cellular Networks,” in *International Journal of Enhanced Research in Science, Technology & Engineering*, 5(2):45-53, February 2016. [1+ citation (Google Scholar)]

J. Beshay, Y. Du, P. Huang, N. Mahabaleshwar, B. McMillin, E. Nourbakhsh, K. Subramani, T. Xi, B. Banerjee, J. Camp, J. Chen, P. Gui, R. Prakash, and D. Rajan. “Wireless Networking Testbed and Emulator (WiNeTestEr),” in *Elsevier Computer Communications Journal*, 73(PA):99-107, January 2016. <http://dx.doi.org/10.1016/j.comcom.2015.08.007> [14+ citations (Google Scholar)]

Y. Du, D. Rajan, and J. Camp. “Analysis and Experimental Evaluation of Rate Adaptation with Transmit

Buffer Information,” *EURASIP Journal on Wireless Communications and Networking*, April 2014, 2014: 62. <https://doi.org/10.1186/1687-1499-2014-62> [3+ citations (Google Scholar)]

P. Huang, D. Rajan, and J. Camp. “An Autoregressive Doppler Spread Estimator for Fading Channels,” *IEEE Communications Letters*, 2(6):655-658, December 2013. [7+ citations (Google Scholar)]

J. Camp, E. Aryafar, and E. Knightly. “Coupled 802.11 Flows in Urban Channels: Model and Experimental Evaluation,” *IEEE/ACM Transactions on Networking*, 20(5):1452-1465, October 2012. [18+ citations (Google Scholar)]

H. Patil, J. Camp, and S. Szygenda. “Secure Routing in Wireless Sensor Networks Using Identity-based Cryptography,” in *International Journal of Applied Science and Technology*, 1(5):1-14, October 2011.

J. Camp and E. Knightly, “Modulation Rate Adaptation in Urban and Vehicular Environments: Cross-layer Implementation and Experimental Evaluation,” *IEEE/ACM Transactions on Networking*, 18(6):1949-1962, December 2010. [264+ citations (Google Scholar)]

J. Camp and E. Knightly, “The IEEE 802.11s Extended Service Set Mesh Networking Standard,” *IEEE Communications Magazine*, 46(8):120-126, August 2008. [270+ citations (Google Scholar)]

A. Khattab, J. Camp, C. Hunter, P. Murphy, A. Sabharwal, and E. Knightly, “WARP: A Flexible Platform for Clean-Slate Wireless Medium Access Protocol Design,” in *ACM SIGMOBILE Mobile Computing and Communications Review*, 12(1):56-58, January 2008. [110+ citations (Google Scholar)]

J. Camp, E. Knightly, and W. Reed, “Developing and Deploying Multihop Wireless Networks for Low-Income Communities,” *Journal of Urban Technology*, 13(3): 129-137, December 2006. [36+ citations (Google Scholar)]

#### PEER-REVIEWED CONFERENCE AND WORKSHOP PAPERS

N. C. Matson, M. H. Syed, S. Song, D. Rajan, and J. Camp. “Effect of Antenna Orientation on the Air-to-Air Channel in Arbitrary 3D Space,” to appear in *Proceedings of IEEE WoWMoM 3rd Workshop on Wireless Networking, Planning, and Computing for UAV Swarms (SwarmNet)*, June 2021.

S. Gupta, D. Rajan, and J. Camp. “NOMA Enabled Computation and Communication Resource Trade-off for Mobile Edge Computing,” in *Proceedings of IEEE WCNC*, 2021.

Y. Alkhrijah, J. Camp, and D. Rajan. “Full Duplex Multiuser MIMO MAC Protocol (FD-MUMAC), in *Proceedings of IEEE Global Communications Conference: Mobile and Wireless Networks (IEEE GLOBECOM)*, December, 2020.

J. Wensowitch, M. Badi, D. Rajan, and J. Camp. “Building and Simulating Multi-Dimensional Drone Topologies, in *Proceedings of ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (ACM MSWiM)*, November, 2020.

H. Rathore, A. Samant, G. Koutitas. “mmMoReEdge: A mmWave Modular and Reconfigurable Testbed Design using a Smart Edge Framework,” in *Proceedings of IEEE PerCom - SmartEdge 2020: 4th International Workshop on Smart Edge Computing and Networking (invited)*, March, 2020.

G. Dvorocsik, E. Sarris, and J. Camp. “Using Clustering to Find Pitch Subtypes and Effective Pairings,” in *SABR Analytics Conference*, March 2020.

M. Badi, J. Wensowitch, D. Rajan, and J. Camp. “Experimental Evaluation of Antenna Polarization and Elevation Effects on Drone Communications,” in *ACM MSWiM 2019*, November 2019.

- M. Tonnemacher, C. Tarver, J. Cavallaro, and J. Camp. "Machine Learning Enhanced Channel Selection for Unlicensed LTE," in *Proceedings of IEEE DySPAN 2019*, Newark, NJ, November 2019.
- P. Cui, S. Chen, and J. Camp. "GreenLoading: Using the Citizens Band Radio for Energy-Efficient Offloading of Shared Interests," in *Proceedings of 21st ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (ACM MSWiM 2018)*, Montreal, Canada, November 2018. (Best Paper Award Finalist) [4+ citations (Google Scholar)]
- M. Tonnemacher, C. Tarver, V. Chandrasekhar, H. Chen, P. Huang, J. Zhang, J. Cavallaro, and J. Camp. "Opportunistic Channel Access Using Reinforcement Learning in Tiered CBRS Networks," in *Proceedings of IEEE DySPAN 2018*, Seoul, South Korea, October 2018. [11+ citations (Google Scholar)]
- Y. Shi, R. Enami, J. Wensowitch, and J. Camp. "UABeam: UAV-Based Beamforming System Analysis with In-Field Air-to-Ground Channels," in *Proceedings of IEEE SECON 2018*, Hong Kong, China, June 2018. [10+ citations (Google Scholar)]
- Y. Shi, J. Wensowitch, A. Ward, M. Badi, and J. Camp. "Building UAV-based Testbeds for Autonomous Mobility and Beamforming Experimentation," in *Proceedings of IEEE SECON 2018 - First Workshop on Communications, Data Processing and Control for Unmanned Autonomous Systems (CPC-UAV)*, Hong Kong, China, June 2018. [1+ citation (Google Scholar)]
- R. Enami, D. Rajan, and J. Camp. "RAIK: Regional Analysis with Geodata and Crowdsourcing to Infer Key Performance Indicators," in *Proceedings of IEEE Wireless Communications and Networking Conference (WCNC) - Emerging Technologies, Architectures and Services*, Barcelona, Spain, April 2018. [5+ citations (Google Scholar)]
- Y. Shi, R. Enami, J. Wensowitch, and J. Camp. "Measurement-Based Characterization of LOS and NLOS Drone-to-Ground Channels," in *Proceedings of IEEE Wireless Communications and Networking Conference (WCNC) - PHY and Fundamentals*, Barcelona, Spain, April 2018. [14+ citations (Google Scholar)]
- R. Enami, Y. Shi, D. Rajan, and J. Camp. "Pre-Crowdsourcing: Predicting Wireless Propagation with Phone-Based Channel Quality Measurements," in *Proceedings of 20th ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (ACM MSWiM 2017)*, Miami, FL, November 2017. [5+ citations (Google Scholar)]
- M. Tonnemacher, D. Rajan, and J. Camp. "GeoRIPE: Efficiently Harvesting Field Measurements for Map-Based Path Loss Modeling," in *Proceedings of 20th ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (ACM MSWiM 2017)*, Miami, FL, November 2017.
- Y. Shi, J. Wensowitch, E. Johnson, and J. Camp. "A Measurement Study of User-Induced Propagation Effects for UHF Frequency Bands," in *Proceedings of IEEE SECON 2017*, San Diego, CA, June 2017. [4+ citations (Google Scholar)]
- P. Cui, Y. Dong, H. Liu, D. Rajan, E. Olinick, and J. Camp. "WhiteMesh: Leveraging White Spaces in Wireless Mesh Networks," in *Proceedings of IEEE WiOpt 2016 (WiNMeE Workshop-The 12th International Workshop on Wireless Network Measurements and Experimentation)* (Invited), Tempe, Arizona, May 2016. [6+ citations (Google Scholar)]
- J. He, H. Liu, P. Cui, J. Landon, D. Rajan, and J. Camp. "Geometry-Based Channel Recognition for Context-Aware Applications," in *Proceedings of IEEE WiOpt 2016 (WiNMeE Workshop-The 12th International Workshop on Wireless Network Measurements and Experimentation)* (Invited), Tempe, Arizona, May 2016.
- P. Cui, M. Tonnemacher, D. Rajan, and J. Camp. "WhiteCell: Energy-Efficient Use of Unlicensed Frequency Bands for Cellular Offloading," in *Proceedings of IEEE DySPAN 2015*, Stockholm, Sweden, October 2015.

- Y. Du, E. Aryafar, P. Cui, J. Camp, and M. Chiang, "SAMU: Design and Implementation of Selectivity-Aware MU-MIMO for Wideband WiFi," in *Proceedings of IEEE SECON 2015*, Seattle, Washington, June 2015. [28% acceptance rate, 20+ citations (Google Scholar)]
- H. Liu, J. He, O. Altintas, R. Vuyyuru, J. Camp, and D. Rajan. "FIT: On-the-Fly, In-Situ Training with Sensor Data for SNR-Based Rate Selection," in *Proceedings of IEEE WCNC*, New Orleans, Louisiana, March 2015.
- J. Beshay, Y. Du, P. Huang, N. Mahabaleshwar, B. McMillin, E. Nourbakhsh, K. Subramani, T. Xi, B. Banerjee, J. Camp, J. Chen, P. Gui, R. Prakash, and D. Rajan. "Wireless Networking Testbed and Emulator (WiNeTestEr)," in *Proceedings of ACM MSWiM*, Montreal, Canada, September 2014. [24% acceptance rate, 14+ citations (Google Scholar)]
- P. Cui, H. Liu, D. Rajan, and J. Camp, "A Measurement Study of White Spaces Across Diverse Population Densities," in *Proceedings of IEEE WiOpt 2014 (WiNMeE Workshop)*, Hammamet, Tunisia, May, 2014.
- Y. Du, E. Aryafar, J. Camp, and M. Chiang. "iBeam: Intelligent Client-Side Multi-User Beamforming in Wireless Networks," in *Proceedings of IEEE INFOCOM 2014*, Toronto, Canada, April 2014. [19% acceptance rate, 31+ citations (Google Scholar)]
- Y. Du, P. Huang, D. Rajan, and J. Camp. "CIPRA: Coherence-Aware Channel Indication and Prediction for Rate Adaptation," in *Proceedings of IEEE International Wireless Communications and Mobile Computing Conference (IWCMC 2013): Wireless Networking Symposium*, Cagliari, Sardinia, Italy, July 2013. [4+ citations (Google Scholar)]
- Y. Du, D. Rajan, and J. Camp. "Implementation and Evaluation of Channel Estimation and Phase Tracking for Vehicular Networks," in *Proceedings of IEEE International Wireless Communications and Mobile Computing Conference (IWCMC 2013): Vehicular Communications Symposium*, Cagliari, Sardinia, Italy, July 2013. [2+ citations (Google Scholar)]
- Y. Du, D. Rajan, and J. Camp. "Analysis and Experimental Evaluation of Rate Adaptation with Transmit Buffer Information," in *Proceedings of IEEE International Wireless Communications and Mobile Computing Conference (IWCMC 2013): Wireless Networking Symposium*, Cagliari, Sardinia, Italy, July 2013. [3+ citations (Google Scholar)]
- P. Cui, H. Liu, J. He, O. Altintas, R. Vuyyuru, D. Rajan, and J. Camp. "Leveraging Diverse Propagation and Context for Multi-Modal Vehicular Applications," in *Proceedings of IEEE WiVeC 2013*, Dresden, Germany, June 2013. [12+ citations (Google Scholar)]
- P. Huang, M. Tonnemacher, Y. Du, D. Rajan, and J. Camp. "Towards Scalable Network Emulation: Channel Accuracy Versus Implementation Resources," in *Proceedings of IEEE INFOCOM 2013*, Turin, Italy, April 2013. [17% acceptance rate, 9+ citations (Google Scholar)]
- H. Liu, J. He, D. Rajan, and J. Camp. "Outlier Detection for Training-Based Adaptive Protocols," in *Proceedings of IEEE WCNC 2013 - MAC*, Shanghai, China, April 2013. [3+ citations (Google Scholar)]
- P. Huang, D. Rajan, and J. Camp. "Weibull and Suzuki Fading Channel Generator Design to Reduce Hardware Resources," in *Proceedings of IEEE WCNC 2013 - PHY*, Shanghai, China, April 2013. [12+ citations (Google Scholar)]
- R. Meikle and J. Camp. "A Global Measurement Study of Context-Based Propagation and User Mobility," in *Proceedings of ACM MobiSys (HotPlanet 2012 Workshop)*, Low Wood Bay, Lake District, United Kingdom, June 2012. [12+ citations (Google Scholar)]
- H. Liu, J. He, P. Cui, J. Camp, and D. Rajan. "ASTRA: Application of Sequential Training to Rate Adapta-

tion,” in *Proceedings of IEEE SECON*, Seoul, Korea, June 2012. [19% acceptance rate, 8+ citations (Google Scholar)]

J. He, H. Liu, P. Cui, J. Landon, O. Altintas, R. Vuyyuru, D. Rajan, and J. Camp. “Design and Experimentation of Context-aware Link-level Adaptation,” in *Proceedings of IEEE INFOCOM 2012 (Mini-Conference)*, Miami, FL, March 2012. [15+ citations (Google Scholar)]

J. Camp, O. Altintas, R. Vuyyuru and D. Rajan, “Context-aware Collection, Decision, and Distribution (C2D2) Engine for Multi-Dimensional Adaptation in Vehicular Networks,” in *The Eighth ACM International Workshop on Vehicular Inter-NETworking (ACM VANET 2011)*, Las Vegas, Nevada, September, 2011. [4+ citations (Google Scholar)]

H. Patil, J. Camp, and S. Szygenda, “Identity Based Authentication using Cross Layer Design approach in Wireless Sensor Networks,” in *Proceedings of World Multiconference on Systemics, Cybernetics and Informatics (WMSCI 2011)*, Orlando, Florida, July, 2011. [4+ citations (Google Scholar)]

J. Camp, E. Aryafar, and E. Knightly. “Coupled 802.11 Flows in Urban Channels: Model and Experimental Evaluation,” in *Proceedings of INFOCOM 2010*, San Diego, California, March, 2010. [18% acceptance rate, 18+ citations (Google Scholar)]

J. Camp and E. Knightly, “Modulation Rate Adaptation in Urban and Vehicular Environments: Cross-layer Implementation and Experimental Evaluation,” in *Proceedings of ACM MobiCom 2008*, San Francisco, California, September 2008. [12% acceptance rate, 264+ citations (Google Scholar)]

J. Camp, V. Mancuso, O. Gurewitz, and E. Knightly, “A Measurement Study of Multiplicative Overhead Effects in Wireless Networks,” in *Proceedings of IEEE INFOCOM 2008*, Phoenix, Arizona, April 2008. [20% acceptance rate, 45+ citations (Google Scholar)]

J. Shi, O. Gurewitz, V. Mancuso, J. Camp and E. Knightly, “Measurement and Modeling of the Origins of Starvation in Congestion Controlled Mesh Networks,” in *Proceedings of IEEE INFOCOM 2008*, Phoenix, Arizona, April 2008. [20% acceptance rate, 73+ citations (Google Scholar)]

C. Hunter, J. Camp, P. Murphy, A. Sabharwal, and C. Dick, “A Flexible Framework for Wireless Medium Access Protocols,” Invited Paper in *Proceedings of Asilomar Conference 2006*, Pacific Grove, CA, November 2006. [41+ citations (Google Scholar)]

J. Camp, J. Robinson, C. Steger, and E. Knightly, “Measurement Driven Deployment of a Two-Tier Urban Mesh Access Network,” in *Proceedings of ACM MobiSys 2006*, Uppsala, Sweden, June 2006. [16% acceptance rate, 273+ citations (Google Scholar)]

#### THESES

J. Camp, “Experimental and Analytical Evaluation of Embedded Link Performance with Small-Scale Channel Fluctuations,” PhD Thesis, Rice University, May 2009. (**Best Engineering Thesis**) [14+ citations (Google Scholar)]

J. Camp, “Measurement Driven Deployment of a Two-Tier Urban Mesh Access Network,” MS Thesis, Rice University, December 2005. [273+ citations (Google Scholar)]

#### DEMONSTRATIONS

J. Camp, A. Khattab, C. Hunter, P. Murphy, A. Sabharwal, and E. Knightly, “Cross-Layer Rate Adaptation Using WARP,” ACM MobiCom, San Francisco, California, September 2008.

J. Camp, A. Khattab, C. Hunter, P. Murphy, A. Sabharwal, and E. Knightly, “Cross-Layer Rate Adaptation

Using WARP,” IEEE INFOCOM, Phoenix, Arizona, April 2008.

A. Khattab, J. Camp, C. Hunter, P. Murphy, A. Sabharwal, and E. Knightly, “WARP: A Flexible Platform for Clean-Slate Wireless Medium Access Protocol Design,” ACM MobiCom, Montreal, Canada, September 2007. [2+ citations (Google Scholar)]

J. Camp, A. Khattab, C. Hunter, P. Murphy, A. Sabharwal, and E. Knightly, “Clean-slate Mesh Protocol Design using WARP,” ACM MobiSys, San Juan, Puerto Rico, June 2007.

P. Murphy, C. Hunter, J. Camp, A. Khattab, E. Knightly, and A. Sabharwal, “Clean-slate Multi-hop Wireless Networks using WARP,” IEEE INFOCOM, Anchorage, Alaska, May 2007.

#### PATENTS

B. Story, D. Rajan, and J. Camp. “Method and Apparatus to Infer Structural Response from User-Device Measurements,” Patent pending (since 2017).

B. Story, D. Rajan, and J. Camp. “Method and Apparatus to Infer Structural Stresses with Visual Image and Video Data,” U.S. Patent Number: 10846819, Publication Date: November 24, 2020.

M. Tonnemacher, D. Rajan, and J. Camp. “Using Geographical Features to Reduce In-Field Propagation Experimentation,” U.S. Patent Number: 9913146, Publication Date: March 6, 2018, Priority Date: January 6, 2017.

J. Camp, O. Altintas, R. Vuyyuru, and D. Rajan. “Context-Aware Analysis and Adaptation,” U.S. Patent Number: US20130073506 A1, Publication Date: March 21, 2013, Priority Date: September 16, 2011. [33+ citations (Google Scholar)]

#### TEACHING EXPERIENCE

**Course Instructor**, Southern Methodist University (SMU), Dallas, TX

- ECE 3381 (Spring 2021): Microcontrollers and Embedded Systems
- ECE 3181 (Spring 2021): Microcontrollers and Embedded Systems Lab
- ECE 5/7377 (Fall 2020): Embedded Wireless Design Laboratory
- ECE 5/7393 (Taos July 2020): In-Field Drone Communications Experimentation
- ECE 3381 (Spring 2020): Microcontrollers and Embedded Systems
- ECE 3181 (Spring 2020): Microcontrollers and Embedded Systems Lab
- ECE 5/7377 (Fall 2019): Embedded Wireless Design Laboratory
- ECE 5/7393 (Taos June 2019): Intro to/Advanced Drone Communications
- ECE 3381 (Spring 2019): Microcontrollers and Embedded Systems
- ECE 3181 (Spring 2019): Microcontrollers and Embedded Systems Lab
- EE 5/7393 (Taos June 2018): Introduction to Drone Communications
- EE 3381 (Spring 2018): Microcontrollers and Embedded Systems
- EE 3181 (Spring 2018): Microcontrollers and Embedded Systems Lab
- EE 5/7377 (Fall 2017): Embedded Wireless Design Laboratory
- EE 7395/CSE 5394 (Taos June 2017): Measurement Study Design with Phones and Drones
- EE 3381 (Spring 2017): Microcontrollers and Embedded Systems
- EE 3181 (Spring 2017): Microcontrollers and Embedded Systems Lab
- EE 5/7378 (Fall 2016): Mobile Phone Embedded Design



- EE 5/7378 (Taos June 2016): Mobile Phone Embedded Design
- EE 3381 (Spring 2016): Microcontrollers and Embedded Systems
- EE 3181 (Spring 2016): Microcontrollers and Embedded Systems Lab
- EE 5/7377 (Fall 2015): Embedded Wireless Design Laboratory
- EE 3381 (Spring 2015): Microcontrollers and Embedded Systems
- EE 3181 (Spring 2015): Microcontrollers and Embedded Systems Lab
- EE 5/7378 (Fall 2014): Mobile Phone Embedded Design
- EE 3381 (Spring 2014): Microcontrollers and Embedded Systems
- EE 3181 (Spring 2014): Microcontrollers and Embedded Systems Lab
- EE 5/7377 (Fall 2013): Embedded Wireless Design Laboratory
- EE 3381 (Spring 2013): Microcontrollers and Embedded Systems
- EE 3181 (Spring 2013): Microcontrollers and Embedded Systems Lab
- EE 5/7378 (Fall 2012): Mobile Phone Embedded Design
- EE 8378 (Spring 2012): Performance Modeling in Communication Networks
- EE 3381 (Spring 2012, Spring 2011): Microprocessors
- EE 3181 (Spring 2012, Spring 2011): Microprocessors Lab
- EE 5/7377 (Fall 2011): Wireless Communications and Lab
- EE 5/7390 (Fall 2010): Mobile Phone Application Programming
- EE 8391 (Spring 2010): Embedded Wireless Protocol Design Lab
- EE 5/7392 (Fall 2009): Special Topics in Wireless Networking

**Teaching Assistant**, Rice University, Houston, TX

- ELEC 438 (Spring 2005, Spring 2007): Wireless Networking for Under-Resourced Urban Communities
- ELEC 220 (Spring 2004, Spring 2006): Fundamentals of Computer Engineering

**PRIOR PROFESSIONAL EXPERIENCE**

**Rice University**, Houston, Texas USA

*Research Assistant*

**Fall 2003 - Summer 2009**

Performed research: (i) architecting, deploying, and evaluating an urban mesh network, the Technology For All (TFA) Wireless Network, which serves 4,000 users and covering 3 km<sup>2</sup>, surpassing the density of any existing wireless research testbed, and (ii) designing, implementing, and evaluating clean-slate protocols for media access and modulation rate adaptation on the Wireless Open-Access Research Platform (WARP).

**At-scale Urban Experimentation**

**Spring 2004 - Summer 2009**

Developed a measurement-driven deployment strategy for the TFA Network which decreased the deployment cost by an order of magnitude. Showed the overhead on a wireless network has an amplified effect, causing the throughput of the network to decrease by up to 50 times the injected overhead rate and significantly altering the overhead-vs.-benefit tradeoff of control algorithms. Measured and first to analytically model the unfairness of information asymmetry and the physical layer capture effect in the TFA Network and generally for multirate CSMA networks.

**Clean-slate and Cross-Layer Design**

**Spring 2004 - Summer 2009**

Developed a CSMA MAC protocol and co-designed a flexible MAC framework enabling cross-layer interaction of MAC and PHY on the WARP platform. Implemented and designed multiple and previously unimplemented modulation rate adaptation algorithms using WARP. In residential and downtown environments, experimentally showed that all prior rate adaptation protocols fail to track urban channel conditions. First

to consider vehicular mobility in rate adaptation evaluation and found that SNR and coherence time must be considered jointly to accurately track urban channel conditions.

**Technology For All**, Houston, Texas USA

*Chief Network Architect and TFA Staff*

**May, 2004 - June, 2009**

Deployed and managed a wireless mesh network in the low-income neighborhood of Pecan Park (East End of Houston). Collaborated with individuals from Methodist Hospital, Houston Public Library, Houston Community College, Young Men's Christian Association (YMCA), and Houston Independent School District. Other responsibilities include operations, inventory, and ordering as well as marketing the network to neighborhood residents.

**Intel Corporation**, Austin, Texas USA

*Hardware Design Engineer/Co-op*

**May, 2002 - August, 2003**

Used Perl and MySQL to build a regression management system database used to store test results of a next-generation network processor (Gigabit speed).

**University of Texas at Austin**, Austin, Texas USA

*Volunteer Undergraduate Researcher*

**December, 2002 - May, 2003**

Worked on a team of three, under the supervision of Dr. Yale Patt, to envision, architect, design, and verify a fully-functioning LC-3 (16 instruction set designed by Yale Patt) computer implemented in VHDL with monitor and keyboard device drivers written in LC-3 assembly.

**Intel Corporation**, Folsom, CA USA

*Component Design Engineer/Co-op*

**January, 2000 - August, 2000**

Used Perl to aid P64H2 (Bridge from PCI/PCI-X to Hublink Buses) Design Team by porting and debugging Full Chip Tests (133) from P64H in the Bus Functional Language on the PCI Bus.

**NASA - Johnson Space Center**, Houston, TX USA

*Pre-Co-op*

**May, 1998 - August, 1999**

Programmed in 4th Dimension database environment, Multilinx, to build an operational database containing the internal systems of the X-38 Emergency Crew Return Vehicle. Produced a mathematical correlation of an infrared lamp experiment in a vacuum chamber using a UNIX application for the TransHab, an inflatable inhabitant module for the International Space Station.

*SHARP Apprentice*

**May, 1997 - August, 1997**

Created a FORTRAN simulation to emulate the reception of an antenna set to travel on the International Space Station from the TDRS (Tracking Data Relay Satellite).

**MEDIA COVERAGE**

**3-D Drone Applications Hold Great Promise for Communications Networks**, SMU Lyle Now Magazine, Spring 2020.

(<https://online.flippingbook.com/view/767518/4/>)

**On the Fly: SMU Engineers Set Up Innovative Lab for Drone Study**, SMU.edu Home Page, February, 2020.

(<https://www.smu.edu/stories/on-the-fly>)

**Helping Drones Communicate with Joseph Camp, Ph.D., Associate Professor of Electrical Engineering**, MarketScale Software and Technology Podcast, November 2, 2018.

(<https://marketscale.com/industries/software-and-technology/helping-drones-communicate-with-joseph-camp->

ph-d-associate-professor-of-electrical-engineering-at-smu/)

**SMU Engineering Profs Receive NSF Grant to Build Multi-Dimensional Drone Communication Framework**, SMU Blog, September 26, 2018.

(<https://blog.smu.edu/research/2018/09/26/smu-engineering-profs-receive-nsf-grant-to-build-multi-dimensional-drone-communication-framework/>)

**DARPA's Software Defined Radio (SDR) Hackfest Creates Solutions for Spectrum Challenges: SDR community answers call to explore interplay of radio and drone technology during weeklong event**, Defense Advanced Research Projects Agency: News and Events, Dec. 14, 2017.

(<https://www.darpa.mil/news-events/2017-12-14>)

**DARPA Software Defined Radio (SDR) Hackfest Selects Teams to Explore Cyber-Physical Intersection of SDR and Drone Technology: Yearlong roadshow culminates in finale event where eight teams will convene to explore the emerging confluence of radio and information technology**, Defense Advanced Research Projects Agency: News and Events, Oct. 16, 2017.

(<https://www.darpa.mil/news-events/2017-10-16>)

**SMU Students Taking Wireless Vehicle Tech to the Streets**, Dallas Innovates, Jan 18, 2017.

(<https://dallasinnovates.com/smu-students-taking-wireless-vehicle-tech-to-the-streets/>)

**31 SMU professors receive tenure**, promotions effective in 2015-16, SMU Blog, May 13, 2015.

(<https://blog.smu.edu/forum/2015/05/13/31-smu-professors-receive-tenure-promotions-effective-in-2015-16/>)

**SMU's Lyle School students win 20over20 hackathon and \$10k prize**, Dallas Morning News, Sept. 25, 2013. Students Involved: Matthew Tonnemacher (Ph.D. Student) and Eric Johnson (MS Alumni)

(<http://bizbeatblog.dallasnews.com/2013/09/smus-lyle-school-students-win-20over20-hackathon-and-10k-prize.html>)

**Lyle School's Joseph Camp Wins Prestigious NSF CAREER Award for Wireless Network Research**, SMU Press Release, Feb. 23, 2012.

(<http://www.smu.edu/News/2012/joseph-camp-nsf-23feb2012>)

**WiEye - WiFi Scanner**, Android Blip, Apr. 14, 2011.

(<http://www.androidblip.com/android-apps/wieye-wifi-scanner-156543.html>)

**"Dude, Where's My Droid?" - Seek Droid - Securing Your Android Devices**, PRWeb, Mar. 3, 2011.

(<http://www.prweb.com/releases/2011/03/prweb5127134.htm>)

**Self-tracking software helping people stay in shape**, Pegasus News, Oct. 27, 2009.

(<http://www.pegasusnews.com/news/2009/oct/27/self-tracking-software-helping-people-stay-shape/>)

**In-Home Health Care Via Wireless Networks, NSF Awards \$1.5M For Study**, Medical News Today, April 28, 2008.

(<http://www.medicalnewstoday.com/articles/105396.php>)

**Rice team Brings Wireless Internet to Houston Community**, Rice at Large, Issue 6, Spring 2008.

([http://tfa.rice.edu/news\\_n\\_media/Rice-at-Large-Spring-08.pdf](http://tfa.rice.edu/news_n_media/Rice-at-Large-Spring-08.pdf))

**Bringing Wireless Internet to the Masses**, CBS11 News KHOU/TV, Feb. 5, 2008.

(<http://www.khou.com/video/news-index.html?nvid=215101>)

**One East Houston Section Wi-Fi Friendly**, FOX26 News KRIV/TV, Aug. 29, 2007.

(<http://www.myfoxboston.com/myfox/pages/News/Detail?contentId=4212221&version=1&locale=EN-US&layoutCode=VS>)

**Can Houston fit into an Internet bubble?**, ABC13 News KTRK/TV, Apr. 4, 2007.  
([http://abclocal.go.com/ktrk/story?section=sci\\_tech&id=5184404](http://abclocal.go.com/ktrk/story?section=sci_tech&id=5184404))

**Wireless Project Breaks New Ground: Pecan Park users may test new medical devices**, Houston Chronicle, Feb. 15, 2007.  
([http://www.chron.com/CDA/archives/archive.mpl?id=2007\\_4284632](http://www.chron.com/CDA/archives/archive.mpl?id=2007_4284632))

**Wireless Advances: Mesh Wi-Fi is one post-Katrina success story in New Orleans**, IEEE Spectrum Radio, Aug. 2006.  
(<http://www.spectrum.ieee.org/radio?date=08.06&segDlink=2>)

**Wi-Fi Nodes to Talk Amongst Themselves**, IEEE Spectrum Magazine, July 2006.  
(<http://www.spectrum.ieee.org/jul06/4114>)

**Doctoral Student Helps Provide Wireless Computer Access**, Rice News, Sept. 22, 2005.  
(<http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=7724&SnID=2>)

**Evacuees Reconnecting with Loved Ones**, NPR, Sept. 6, 2005.  
(<http://www.kuhf.org/site/News2?page=NewsArticle&id=13662>)

**Municipal Wireless Networks Open New Access and Old Debates**, IEEE Internet Computing Magazine, June 2005.  
(<http://ieeexplore.ieee.org/iel5/4236/30969/01438298.pdf?arnumber=1438298>)

**Bringing Wireless Internet to Houston's East End**, Rice News, Feb. 24, 2005.  
(<http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=7118&SnID=2>)

#### ACTIVITIES

Member, Institute of Electrical and Electronics Engineers (IEEE, 2003-present)  
Member, Association for Computing Machinery (ACM, 2009-present)  
Member, Society for American Baseball Research (SABR, 2009-present)  
Leader, Munger Place Church Small Group (2015-2016)  
Leader, Munger Place Church Kitchen Group (2010-2012)  
Deacon Chairman, City of Refuge (COR) Evangelical Presbyterian Church (2007-2009)  
Founder/Leader, Crossover: COR Small Group for Inner-City College Students (2007-2009)  
Leader, COR Youth Group (2004-2007)  
Finisher, Too Cold To Hold Half Marathon (January 2017 - 2:02:15)  
Finisher, Too Cold To Hold Half Marathon (January 2016 - 2:02:15)  
Finisher, Rock n' Roll Dallas Half Marathon (March 2014 - 2:03:59)  
Finisher, Rock n' Roll San Antonio Half Marathon (November 2013 - 2:13:13)  
Finisher, Rock n' Roll Dallas Half Marathon (March 2013 - 2:14:47)  
Finisher, Aramco Houston Half Marathon (January 2009 - 2:15:19)  
Finisher, Big D Texas Half Marathon (April 2006 - 2:34:12)

#### **Southern Methodist University**

Library Resources Task Force (2016-2019)  
General Education Review Task Force (2016-2018)  
Presidential Scholar Review Committee (2014-2017)  
Undergraduate Research Steering Committee (2013-2017)

#### **SMU Lyle School of Engineering**

Strategic Plan Culture Task Force Co-Chair (2018)  
Senior Design Review Task Force (2016)  
Lyle Engineering IT Task Force (2013, 2016)

**SMU Electrical and Computer Engineering Department**

ECE Undergraduate Curriculum Committee Chair (2016-present)  
Telecommunications Program Committee Member (2009-2017)  
MS in Telecommunications Advisor (2009-2017)  
EE Undergraduate Curriculum Committee Member (2009-2013,2014-2016)  
Lyle in the City Volunteer (2009)

**Area Editor**

Elsevier Computer Networks (COMNETs, 2019-present)  
ACM SIGCOMM Computer Communication Review (CCR, 2012-present)

**Technical Program Committee Co-Chair**

IEEE WiNMeE Workshop 2014: co-located with IEEE WiOpt  
IEEE WiNTECH Workshop 2011: co-located with ACM MobiCom  
IEEE MeshTech Workshop 2010: co-located with IEEE MASS  
ACM MobiHoc S<sup>3</sup> Workshop 2009: co-located with ACM MobiHoc

**Demo/Poster Co-Chair**

IEEE International Conference on Computer Communications, IEEE INFOCOM 2016

**Workshop Co-Chair**

IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks, IEEE SECON 2013

**Finance Chair**

20th ACM Annual International Conference on Mobile Computing and Networking, ACM MobiCom 2014  
20th IEEE International Conference on Network Protocols, IEEE ICNP 2012

**Publication Chair**

IEEE IEEE International Symposium on Dynamic Spectrum Access Networks, IEEE DySPAN 2017  
IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks, IEEE SECON 2011

**Travel Grants Co-Chair**

IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks, IEEE SECON 2015

**Technical Program Committee Member**

IEEE IEEE International Symposium on Dynamic Spectrum Access Networks, IEEE DySPAN 2017, 2018  
IEEE International Conference on Computer Communications, IEEE INFOCOM 2016  
ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems, ACM MSWiM 2015  
ACM Annual International Conference on Mobile Computing and Networking, ACM MobiCom 2014  
IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks, IEEE SECON 2010-2015  
ACM International Symposium on Mobile Ad Hoc Networking and Computing, ACM MobiHoc 2011, 2012  
IEEE WiNTECH Workshop 2014: co-located with ACM MobiCom  
IEEE MeshTech Workshop 2011: co-located with IEEE MASS  
5th IEEE Workshop on Wireless Mesh Networks, IEEE WiMesh 2010  
11th IEEE International Symposium on a "World of Wireless, Mobile and Multimedia Networks," IEEE WoWMoM 2010, 2013  
29th Conference of the IEEE Communications Society, Work In Progress Session, IEEE INFOCOM 2010  
WiP

### **Technical Reviewer**

**Journals:** IEEE Journal of Selected Areas of Communications, IEEE Transactions on Wireless Communications, IEEE Transactions on Mobile Computing, IEEE Transactions on Wireless and Mobile Computing, IEEE/ACM Transactions on Networking, IEEE Transactions on Vehicular Technology; **Magazines:** IEEE Network Magazine, IEEE Communications Magazine, IEEE Communication Letters; **Conferences:** IEEE INFOCOM, ACM MobiCom, ACM MobiHoc, IEEE VTC, ACM SIGMETRICS, ACM WICON; **Workshops:** ACM E-Wind, ACM/SIGMOBILE REALMAN, IEEE WinMee, IEEE CCNC

### DOCTORAL DISSERTATIONS SUPERVISED

Yan Shi, "Feedback Mechanisms for Centralized and Distributed Mobile Systems," December 2019.  
Matthew Tonnemacher, "Leveraging Geographical and Spectral Information for Efficient Cellular Systems," December 2019.  
Rita Enami, "Wireless Channel Characterization based on Crowdsourced Data and Geographical Features," May 2019.  
Pengfei Cui, "Exploiting Spectrum Agility in Wireless Links and Networks," September 2015.  
Yongjiu Du, "Exploiting Dynamic Channel Information for FPGA-Based Emulation and Adaptation," May 2014.

### MASTER'S THESES SUPERVISED

John Wensowitch, "Design of a Drone-Flight-Enabled Wireless Isolation Chamber," May 2020. Eric Johnson, "Smartphone-based Crowdsourcing for Wireless Characterization," August 2015.  
Matthew Tonnemacher, "Analyzing the Impact of Path Loss Variation in Time and Space," August 2013.

### CURRENT GRADUATE STUDENT SUPERVISION

Mahmoud Badi (2017-present)  
John Wensowitch (2019-present)  
Muhammad Hashir Syed (2019-present)  
Sicheng Song (2019-present)  
Neil Cameron Matson (2020-present)

### UNDERGRADUATE STUDENT SUPERVISION

Felicity Gonzalez, Conrad Small, and Jeffrey Taylor (2021)  
Felicity Gonzalez, Jimmy Gassner, Ryan Gloria, and Patrick Wojcik (2020)  
John Wensowitch (2016-2019)  
Shel Matongo, Dani Farren, Kyle Melliza, Lauren Dube, Harry Wang, Ankit Pradhan (2019)  
Lexie Hancock, Evan Siewert, Dylan Colbert (2018)  
Alex Ward (2017-2018)  
Cameron Matson (2015-2017)  
Jeff Limbocker (2014)  
Philip Davis (2013-2015)  
Eric Johnson (2012-2014)  
Jonathan Landon (2011-2013)  
Robert Syer, Rod Meikle (2011-2012)  
Joseph Esau (2010)

### REFERENCES

Available upon request.