

Mahesh K. Banavar

Assistant Professor, Department of Electrical and Computer Engineering
Assistant Professor, Institute of STEM Education (Courtesy Appointment)

Clarkson University,
Potsdam, NY 13699.

adweb.clarkson.edu/~mbanavar



EDUCATION

- 2005 – 2010 Doctor of Philosophy, Electrical Engineering, Arizona State University.
Research area: Signal Processing and Communications.
Co-chairs: Andreas Spanias and Cihan Tepedelenlioglu.
Dissertation: “Distributed Inference over Multiple-Access Channels with Wireless Sensor Networks”
- 2005 – 2007 Master of Science (in Passing), Electrical Engg, Arizona State University.
- 2001 – 2005 Bachelor of Engineering, Telecommunications Engineering, Visvesvaraya Technological University, India.

RESEARCH EXPERIENCE

- Aug 2014 – present Assistant Professor, Department of Electrical and Computer Engineering, Clarkson University
- Mar 2014 – Jul 2014 Assistant Research Professor, School of Electrical, Computer and Energy Engineering, Arizona State University
- Dec 2010 – Mar 2014 Post-Doctoral Research Associate, School of Electrical, Computer and Energy Engineering, Arizona State University.
- 2006 – 2010 Graduate Research Associate, SenSIP Center, Arizona State University.
Supervisors: Prof. Andreas Spanias, Prof. Cihan Tepedelenlioglu.

TEACHING EXPERIENCE

- Fall 2014 – present Assistant Professor, Department of Electrical and Computer Engineering, Clarkson University.
- Digital Control
 - Digital Signal Processing
 - Systems and Signal Processing
 - Signal Processing and Applications
 - Detection and Estimation Theory
 - Adaptive Signal Processing
 - Digital Communications
- 2008 – present Contributor to the Synthesis Lectures Series for Morgan & Claypool Publishers
- 2011 – 2013 Lecturer, School of Electrical, Computer and Energy Engineering, Arizona State University.
- Circuits I
 - Communication Systems
 - Signals and Systems – I

2006 – 2010 Graduate Teaching Associate (TA), Department of Electrical Engineering, Arizona State University.

2003 – 2004 Undergraduate Teaching Assistant, Department of Telecommunications Engineering, PES Institute of Technology, Bangalore

STUDENTS ADVISED

Graduate Students

K.V. Mack, MS student, Fall 2018 – present
Chinmay Sahu, PhD student, Fall 2017 – present
T. Yang, PhD student, Fall 2015 – present
Blaine Ayotte, MS student, Fall 2017 – present
K.V. Mack, MS student, Fall 2016 – Summer 2018

Undergraduate Students

M. Griffith, Summer 2018 - present
L. Collum, Summer 2018 - present
A. Mahoney, Spring 2018 - present
H. Bashaw, Fall 2017 – Spring 2018
L. Carter, Summer 2016 – Spring 2018, McNair Scholar, Now at ControlPoint Technologies
B. Robistow, Summer 2016 – Spring 2017, Now at Raytheon
R. Newman, Fall 2015 – present
K.V. Mack, Spring 2015 – Spring 2016, see above
T. DePue, Spring 2015 – Spring 2016, Now at BAE Systems
E. Legacy, Spring 2015

GRADUATE STUDENT COMMITTEE SERVICE

PhD Students

Luke Rumbaugh (ECE)
David Illig (ECE)
Devin Kapper (Mathematics)
Shandeepa Wickramasinghe (Mathematics)
Jiaju Huang (ECE)

Master's Students

Md. Parvej Anwar (ECE)

INTELLECTUAL PROPERTY

1. M.K. Banavar, K. Mack, "Localization using wireless signals," United States Patent 10,117,051, October 30, 2018.
2. X. Zhang, C. Tepedelenioglu, M.K. Banavar, A. Spanias, "Distributed location detection in wireless sensor networks," United States Patent 10,028,085, July 17, 2018.
3. X. Zhang, C. Tepedelenioglu, M.K. Banavar, A. Spanias, "Maximum likelihood localization in the presence of channel uncertainties," United States Patent 9,507,011, November 29, 2016.
4. R. Santucci, M.K. Banavar, A. Spanias, C. Tepedelenioglu, "Energy efficient distributed estimation using nonlinear amplifiers," United States Patent 9,461,676, October 4, 2016.

PUBLICATIONS (Full list at <http://adweb.clarkson.edu/~mbanavar/wordpress/publications/>)

Dissertation

- [1] M.K. Banavar, "Distributed Inference over Multiple-Access Channels with Wireless Sensor Networks," Ph.D. dissertation, Arizona State University, December 2010.

Books

- [2] S. Zhang, C. Tepedelenlioglu, A. Spanias, M.K. Banavar, *Distributed Network Structure Estimation Using Consensus Methods*, Morgan & Claypool Publishers, ISBN: 1681732912, 9781681732916, 2018.
- [3] X. Zhang, C. Tepedelenlioglu, M.K. Banavar, A. Spanias, *Node Localization in Wireless Sensor Networks*, Morgan & Claypool Publishers, ISBN: 1627058931, 9781627058933, 2016.
- [4] N. Kovvali, M.K. Banavar, A. Spanias, *An Introduction to Kalman Filtering with MATLAB Examples*, Morgan & Claypool Publishers, ISBN: 9781627051392, 9781627051408, 2013.
- [5] H. Braun, S.T. Buddha, V. Krishnan, C. Tepedelenlioglu, A. Spanias, T. Takehara, T. Yeider, M. Banavar, S. Takada, *Signal Processing for Solar Array Monitoring, Fault Detection, and Optimization*, Morgan & Claypool Publishers, ISBN: 9781608459483, 9781608459490, 2012.
- [6] A.B. Narasimhamurthy, M.K. Banavar, C. Tepedelenlioglu, *OFDM Systems for Wireless Communications*, Morgan & Claypool Publishers, ISBN: 9781598297010, 9781598297027, 2010.
- [7] J. Foutz, A. Spanias, M.K. Banavar, *Narrowband Direction of Arrival Estimation for Antenna Arrays*, Morgan & Claypool Publishers, ISBN: 9781598296501, 9781598296518, 2008.

Journal Articles

- [8] X. Zhang, C. Tepedelenlioglu, M.K. Banavar, A. Spanias, G. Muniraju, Location Estimation and Detection in Wireless Sensor Networks in the Presence of Fading, *Physical Communications (PHYCOM)*, accepted, 2018.
- [9] J. Sun, T. Yang, K.V. Mack, M.K. Banavar, "UNLOC: Optimal unfolding localization from noisy distance data," *Sampling Theory in Signal and Image Processing*, vol. 17, no. 2, pp. 183-195, 2018.
- [10] G. Muniraju, S. Rao, S. Katoch, A. Spanias, C. Tepedelenlioglu, P. Turaga, M. Banavar and D. Srinivasan, "A Cyber-Physical Photovoltaic Array Monitoring and Control System," *International Journal of Monitoring and Surveillance Technologies Research (IJMSTR)*, vol. 5, no. 3, pp. 33-56, 2018.
- [11] S. Zhang, C. Tepedelenlioglu, M. K. Banavar and A. Spanias, "Distributed Node Counting in Wireless Sensor Networks in the Presence of Communication Noise," in *IEEE Sensors Journal*, vol. 17, no. 4, pp. 1175-1186, Feb. 2017.
- [12] S. Zhang, C. Tepedelenlioglu, M.K. Banavar and A. Spanias, "Max Consensus in Sensor Networks: Non-linear Bounded Transmission and Additive Noise," *IEEE Sensors Journal*, vol. 16, issue. 24, pp. 9089 - 9098, Dec. 2016.
- [13] H. Braun, S.T. Buddha, V. Krishnan, C. Tepedelenlioglu, A. Spanias, M. Banavar, D. Srinivasan, "Topology reconfiguration for optimization of photovoltaic array output", *Sustainable Energy, Grids and Networks*, vol. 6, pp. 58-69, June 2016.

- [14] R. Santucci, M.K. Banavar, A. Spanias, and C. Tepedelenlioglu, "Nonlinear amplify and forward distributed estimation over non-identical channels," *IEEE Transactions on Vehicular Technologies*, vol. 64, no. 11, pp. 5390-5395, November 2015.
- [15] S. Dasarathan, C. Tepedelenlioglu, M. Banavar, A. Spanias, "Robust Consensus in the Presence of Impulsive Channel Noise," *IEEE Transactions on Signal Processing*, vol. 63, no. 8, April 2015.
- [16] M.K. Banavar, J.J. Zhang, B. Chakraborty, H. Kwon, Y. Li, H. Jiang, A. Spanias, C. Tepedelenlioglu, C. Chakrabarti, A. Papandreou-Suppappola, "An Overview of Recent Advances on Distributed and Agile Sensing Algorithms and Implementation," *Digital Signal Processing*, vol. 39, pp. 1-14, January 2015.
- [17] S. Mehta, A. Spanias, J.J. Thiagarajan, M.K. Banavar, K.N. Ramamurthy, R. Santucci, C. Pattichis, P. Spanias, H. Krishnamoorthi, "An Integrated Graphical Environment for Web-based Learning," *Computers in Education Journal*, vol. 5, no. 1, January-March 2014.
- [18] R. Santucci, M. K. Banavar, A. Spanias, and C. Tepedelenlioglu, "Energy-efficient distributed estimation by utilizing a nonlinear amplifier," *IEEE Transactions on Circuits and Systems – I*, vol. 61, no. 1, pp. 302-311, January 2014.
- [19] S. Dasarathan, C. Tepedelenlioglu, M.K. Banavar, A. Spanias, "Non-Linear Distributed Average Consensus using Bounded Transmissions," *IEEE Transactions on Signal Processing*, vol. 61, no. 23, pp. 6000-6009, December 2013.
- [20] M.K. Banavar, C. Tepedelenlioglu, A. Spanias, "Distributed SNR Estimation with Power Constrained Signaling over Gaussian Multiple-Access Channels," *IEEE Transactions on Signal Processing*, vol. 60, no. 6, pp. 3289-3294, June 2012.
- [21] M.K. Banavar, A.D. Smith, C. Tepedelenlioglu, A. Spanias, "On the Effectiveness of Multiple Antennas in Distributed Detection over Fading MACs," *IEEE Transactions on Wireless Communications* vol. 11, no. 5, pp. 1744-1752, May 2012.
- [22] C. Tepedelenlioglu, M.K. Banavar, A. Spanias, "On the Asymptotic Efficiency of Distributed Estimation Systems with Constant Modulus Signals over Multiple-Access Channels," *IEEE Transactions on Information Theory*, vol. 57, no. 10, pp. 7125-7130, October 2011.
- [23] M. K. Banavar, C. Tepedelenlioglu and A. Spanias, "Estimation over fading channels with limited feedback using distributed sensing," *IEEE Transactions on Signal Processing*, vol. 58, no. 1, pp. 414-425, January 2010.
- [24] A. Spanias, C. Huang, A. Natarajan, R. Ferzli, H. Kwon, V. Atti, V. Berisha, L. Iasemidis, H. Krishnamoorthi, P. Spanias, S. Misra, M. Banavar, K. Tsakalis, S. Haag, "Interfacing Java-DSP With a TI-DSK for Use in a Signal Processing Class", *Computers in Education Journal*, vol. 17, no. 3, pp. 27-35, July – September 2007.

Selected Conference Proceedings

- [25] G. Muniraju, C. Tepedelenlioglu, M.K. Banavar, S. Zhang, A. Spanias, "Max Consensus in the Presence of Additive Noise," *52nd Asilomar Conference on Signals, Systems and Computers*, November, 2018.

- [26] A. Dixit, U.S. Shantamallu, A. Spanias, V. Berisha, M.K. Banavar, "Online Machine Learning Experiments in HTML5", *IEEE Frontiers in Education Conference (FIE)*, San Jose, CA, October 2018.
- [27] M.K. Banavar, S. Rivera, D. Barry, "Mobile apps for Incorporating Science and Engineering Practices in K-12 STEM Labs," *IEEE Frontiers in Education Conference (FIE)*, San Jose, CA, October 2018.
- [28] S. Katoch, G. Muniraju, S. Rao, A. Spanias, P. Turaga, C. Tepedelenioglu, M.K. Banavar, D. Srinivasan, "Shading Prediction, Fault Detection, and Consensus Estimation for Solar Array Control", in *Proceedings IEEE International Conference on Industrial Cyber - Physical Systems (ICPS)*, Saint-Petersburg, May 2018.
- [29] S. Rao, S. Katoch, P. Turaga, A. Spanias, C. Tepedelenioglu, R. Ayyanar, H. Braun, J. Lee, U. Shanthamallu, M. Banavar, D. Srinivasan, "A Cyber-Physical System Approach for Photovoltaic Array Monitoring and Control," *8th International Conference on Information, Intelligence, Systems & Applications (IISA)*, 2017.
- [30] B. Robistow, R. Newman, T.H. DePue, M.K. Banavar, D. Barry, P. Curtis, A. Spanias, "Reflections: An eModule for echolocation education," *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, New Orleans, LA, pp. 1562-1566, 2017.
- [31] M. K. Banavar, H. Gan, B. Robistow and A. Spanias, "Signal processing and machine learning concepts using the reflections echolocation app," *IEEE Frontiers in Education Conference (FIE)*, Indianapolis, IN, USA, pp. 1-5, 2017.
- [32] A. Dixit, S. Katoch, P. Spanias, M. Banavar, H. Song and A. Spanias, "Development of signal processing online labs using HTML5 and mobile platforms," *IEEE Frontiers in Education Conference (FIE)*, Indianapolis, IN, USA, pp. 1-5, 2017.
- [33] K. Mack and M. K. Banavar, "Teaching ranging and localization using Bluetooth on Android devices," *IEEE Frontiers in Education Conference (FIE)*, Indianapolis, IN, USA, pp. 1-5, 2017.
- [34] G. Muniraju, S. Zhang, C. Tepedelenioglu, M.K. Banavar, A. Spanias, C. Vargas-Rosales, R. Villalpando-Hernandez, "Location Based Distributed Spectral Clustering for Wireless Sensor Networks," *Sensor Signal Processing for Defence Conference (SSPD)*, London, United Kingdom, pp. 1-5, 2017.
- [35] T.H. DePue, B. Robistow, R. Newman, K. Mack, M.K. Banavar, T. Yang, D. Barry, P. Curtis, A. Spanias, "An Android App for Spatial Acoustic Analysis as a Learning Tool," *IEEE Frontiers in Education Conference*, October 2016.
- [36] Z.I. Rauen, N.S. Rolfe, B. Kantarci, M. Banavar and W. Freitag, "A tool for simulation and visualization of distributed estimation in wireless sensor networks," *2016 IEEE Integrated STEM Education Conference (ISEC)*, Princeton, NJ, 2016, pp. 34-36.
- [37] S. Zhang, C. Tepedelenioglu, A. Spanias and M.K. Banavar, "Node counting in wireless sensor networks," *2015 49th Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA, 2015, pp. 360-364.

- [38] D.W. Illig, L.K. Rumbaugh, M.K. Banavar, E.M. Bollt, and W.D. Jemison, "Backscatter suppression via blind signal separation for a 532 nm underwater chaotic lidar rangefinder," in *Proceedings of Oceans '15 MTS/IEEE*, Washington, DC, October 2015.
- [39] L.K. Rumbaugh, D.W. Illig, M.K. Banavar, B. Cochenour, and W.D. Jemison, "A wideband chaotic transmitter for underwater lidar using a diode laser and a fiber processor," in *Proceedings of Oceans '15 MTS/IEEE*, Washington, DC, October 2015.
- [40] A. Spanias, P. Curtis, P. Spanias, M.K. Banavar, "A new signal processing course for digital culture," in *2015 IEEE Frontiers in Education Conference (FIE)*, pp. 1 - 4, 21-24 Oct. 2015.
- [41] H. Braun, S. Peshin, A. Spanias, C. Tepedelenioglu, M. Banavar, G. Kalyanasundaram, D. Srinivasan, "Irradiance estimation for a smart PV array," in *2015 IEEE Energy Conversion Congress and Exposition (ECCE)*, pp. 1095 - 1099, 20-24 Sept. 2015.
- [42] K. Mack, M.K. Banavar, "Bluetooth Localization on Android," in the *Eighteenth Annual Summer 2015 Symposium on Undergraduate Research Experiences (SURE)*, 30 July 2015.
- [43] D.W. Illig, L.K. Rumbaugh, M.K. Banavar, and W.D. Jemison, "Blind signal separation for underwater lidar applications," in *Proceedings of 35th International Workshop on Bayesian Inference and Maximum Entropy Methods in Science and Engineering (MaxEnt 2015)*, Potsdam, NY, July 2015.
- [44] J. Lee, C. Tepedelenioglu, M.K. Banavar, A. Spanias, "Nonlinear diffusion adaptation with bounded transmission over distributed networks," in *2015 IEEE International Conference on Communications (ICC)*, pp. 6707 - 6711, 8-12 June 2015.
- [45] L.K. Rumbaugh, M.K. Banavar, W.D. Jemison, "Underwater optical impulse response measurement using a chaotic lidar sensor," *In Proc. SPIE Defense+ Security*, pp. 945909-945909-14, 2015.
- [46] G. Kalyanasundaram, M. Banavar, A. Spanias, "Audio Modeling and Loudness Estimation with iJDSP Mobile Simulations," *In Proc. IEEE ICASSP 2015*, 2015.
- [47] S. Peshin, D. Ramirez, J. Lee, H. Braun, C. Tepedelenioglu, A. Spanias, M. Banavar, D. Srinivasan, "A Photovoltaic (PV) Array Monitoring Simulator," *IASTED 2015*, (accepted), 2015.
- [48] P. Curtis, M.K. Banavar, V. Weber, A. Spanias, "Signals and Systems Demonstrations for Undergraduates Using Android-based Localization," *In Proc. IEEE FIE 2014*, 2014.
- [49] M.K. Banavar, D. Rajan, P. Spanias, A. Strom, X. Zhang, H. Braun, A. Spanias, "Embedding Android Signal Processing Apps in a High School Math Class - An RET Project," *In Proc. IEEE FIE 2014*, 2014.
- [50] R. Santucci, M.K. Banavar, S. Zhang, A. Spanias, C. Tepedelenioglu, "OFDM-based Distributed Estimation for Rich Scattering Environments," *In Proc. SSPD 2014*, 2014.
- [51] P. Curtis, M.K. Banavar, S. Zhang, A. Spanias, V. Weber, "Android Acoustic Ranging," *In Proc. IISA 2014*, 2014.

- [52] X. Zhang, C. Tepdelenlioglu, M.K. Banavar, A. Spanias, "Distributed Location Detection in Wireless Sensor Networks," *Asilomar Conference on Signals, Systems, and Computers*, 2013.
- [53] S. Zhang, C. Tepdelenlioglu, M.K. Banavar, A. Spanias, "Max-Consensus using the Soft Maximum," *Asilomar Conference on Signals, Systems, and Computers*, 2013.
- [54] S. Zhang, M.K. Banavar, A. Spanias, C. Tepdelenlioglu, X. Zhang, "WIP: Java Tools for Teaching OFDM Principles in Undergraduate Courses," *IEEE FIE 2013*, 2013.
- [55] L. Hinnov, K.N. Ramamurthy, L. Spanias, H. Song, M.K. Banavar, "Interactive Tools for Global Sustainability and Earth Systems: Sea Level Change and Temperature," *IEEE FIE 2013*, 2013.
- [56] D. Rajan, S. Ranganath, P. Spanias, M.K. Banavar, A. Spanias, "Health Monitoring Laboratories by interfacing Physiological Sensors to Mobile Android Devices," *IEEE FIE 2013*, 2013.
- [57] A.S. Spanias, J.J. Thiagarajan, K.N. Ramamurthy, M.K. Banavar, S. Ranganath, X. Zhang, G. Kalyanasundaram, D. Rajan, "E-Book on DSP Theory with Interactive iOS, Java, and Android Simulations," *In Proc. ASEE Annual Conference*, June 2013.
- [58] R. Santucci, M.K. Banavar, A. Spanias, C. Tepdelenlioglu, "Design of Limiting Amplifier Models for Nonlinear Amplify-and-Forward Distributed Estimation," *In Proc. IEEE DSP 2013*, July 2013.
- [59] X. Zhang, C. Tepdelenlioglu, M. Banavar, A. Spanias, "CRLB for the Localization Error in the Presence of Fading," *In Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2013)*, 2013.
- [60] R. Santucci, M.K. Banavar, A. Spanias, C. Tepdelenlioglu, "Estimation for Amplify-and-Forward Transmissions with Nonlinear Amplifiers," *Constantinides International Workshop on Signal Processing (CIWSP)*, January 2013.
- [61] S. Dasarathan, M.K. Banavar, C. Tepdelenlioglu, A. Spanias, "Distributed Average Consensus Using Bounded Transmissions," *2012 Asilomar Conference on Signals, Systems and Computers*, 2012.
- [62] X. Zhang, M.K. Banavar, M. Willerton, A. Manikas, C. Tepdelenlioglu, A. Spanias, T. Thornton, E. Yeatman, A.G. Constantinides, "Performance Comparison of Localization Techniques For Sequential WSN Discovery," *Sensor Signal Processing for Defense (SSPD) Conference*, 2012.
- [63] M. Willerton, M.K. Banavar, X. Zhang, A. Manikas, C. Tepdelenlioglu, A. Spanias, T. Thornton, E. Yeatman, A. Constantinides, "Sequential wireless sensor network discovery using wide aperture array signal processing," *2012 European Signal Processing Conference (EUSIPCO-2012)*, (accepted), 2012.
- [64] S. Ranganath, J. Thiagarajan, K. Ramamurthy, S. Hu, M. Banavar, A. Spanias, "Undergraduate Signal Processing Laboratories for the Android Operating System," *In Proc. ASEE Annual Conference*, June 2012.
- [65] S. Ranganath, J. Thiagarajan, K. Ramamurthy, S. Hu, M. Banavar, A. Spanias, "Work In Progress: Performing Signal Analysis Laboratories using Android Devices," *Proc. Frontiers in Education Conference (FIE)*, (accepted), 2012.

- [66] J. Liu, S. Hu, J.J. Thiagarajan, X. Zhang, S. Ranganath, M.K. Banavar and A. Spanias, "Interactive DSP laboratories on mobile phones and tablets," *Proc. IEEE ICASSP 2012*, Kyoto, Japan, March 2012.
- [67] S. Hu, J. Liu, A. Spanias, J.J. Thiagarajan, K.N. Ramamurthy, X. Zhang, S. Ranganath, M.K. Banavar, "A mobile DSP simulation App for design, testing and education," *IEEE ESPA 2012*, Las Vegas, NV, Jan. 2012.
- [68] J. Liu, A. Spanias, M.K. Banavar, J.J. Thiagarajan, K.N. Ramamurthy, S. Hu and X. Zhang, "Work in progress — Interactive signal-processing labs and simulations on iOS devices," *Proc. Frontiers in Education Conference (FIE)*, pp. F2G-1-F2G-2, 12-15 Oct. 2011.
- [69] J. Liu, J.J. Thiagarajan, A. Spanias, K.N. Ramamurthy, S. Hu and M.K. Banavar, "iPhone/iPad-Based Interactive Laboratory for Signal Processing in Mobile Devices," *Proc. ASEE Annual Conference*, June 2011.
- [70] M.K. Banavar, C. Tepedelenlioglu, A. Spanias, "Distributed SNR estimation using constant modulus signaling over Gaussian multiple-access channels," *Proc. IEEE DSP/SPE Workshop*, pp.24-29, 4-7 Jan. 2011.
- [71] C. Tepedelenlioglu, M.K. Banavar, A. Spanias, "Asymptotic Efficiency of Distributed Estimation from Constant Modulus Sensor Transmissions," *Proc. 44th Asilomar Conference on Signals, Systems and Computers*, pp.1827-1831, Nov. 2010.
- [72] S. Mehta, J.J. Thiagarajan, P. Spanias, K. Ramamurthy, R. Santucci, A. Spanias, S. Haag, M. Banavar, "An Interactive Learning Environment for DSP", *Proc. ASEE Conference*, June 2010.
- [73] M.K. Banavar, A.D. Smith, C. Tepedelenlioglu, A. Spanias, "Distributed Detection over Fading MACs with Multiple Antennas at the Fusion Center," *Proc. International Conference on Acoustics, Speech and Signal Processing (ICASSP 2010)*, pp. 2894-2897, March 2010.
- [74] A.D. Smith, M.K. Banavar, C. Tepedelenlioglu, A. Spanias, "Distributed Estimation over Fading MACs with Multiple Antennas at the Fusion Center," *Proc. Asilomar Conference on Signals, Systems and Computers*, pp. 424-428, 2009.
- [75] M.K. Banavar, C. Tepedelenlioglu, A. Spanias, "Analysis of Distributed Estimation over Fading Multiple Access Channels with Channel State Information at the Sensors," *Proc. Sensor, Signal and Information Processing (SenSIP) Workshop*, May 2008.
- [76] S. Misra, A. Spanias, M.K. Banavar, "Protein Secondary Structure Estimation using Linear Prediction and Cepstral Features," *Proc. Sensor, Signal and Information Processing (SenSIP) Workshop*, May 2008.
- [77] M.K. Banavar, C. Tepedelenlioglu, A. Spanias, "Performance of Distributed Estimation over Multiple Access Fading Channels with Partial Feedback," *Proc. International Conference on Acoustic Speech and Signal Processing (ICASSP 2008)*, pp. 2253-2256, April 2008.
- [78] C. Tepedelenlioglu, M.K. Banavar, A. Spanias, "Asymptotic Analysis of Distributed Estimation over Fading Multiple Access Channels," *Proc. 41st Asilomar Conference on Signals, Systems and Computers*, pp. 2140-2144, November 2007.

[79] A. Spanias, K. Ramamurthy, J. Jayaraman, M. Banavar, C. Huang, "Using Java-DSP and LabVIEW to Perform Undergraduate Labs", *Proc. ASEE Conference*, June 2007.

Invited Talks

Localization and Applications, Center for Advanced Systems and Engineering, Syracuse University, March, 2017.

Research in the CU CoSiNe Lab, IEEE Student Section, Clarkson University, Potsdam, NY, October 2015.

Health Monitoring by Interfacing Physiological Sensor to Mobile Android Devices, AZ Healthcare Information and Management Systems Society (HIMSS), Tempe, AZ, April 2014.

Efficiency of Amplify-and-Forward Distributed Estimation Systems with Amplifier Nonlinearity, Clarkson University, Potsdam, NY, February 2014.

Energy Efficiency of Amplify-and-Forward Distributed Estimation Systems with Amplifier Nonlinearity, Indian Institute of Science, Bangalore, India, August 2013.

Energy Efficient Distributed Estimation with Amplifier Nonlinearity, CMR Institute of Technology, Bangalore, India, August 2013.

Distributed Algorithms for Signal Processing in Wireless Sensor Networks, International Institute of Information Technology, Bangalore (IIITB), August 2012.

Sequential Wireless Sensor Network Discovery using Wide Aperture Array Signal Processing, MoD UDRC in Signal Processing, Imperial College London, February 2012.

Constant-Modulus Signaling for Wireless Sensor Networks, CMR Institute of Technology, Bangalore, India, July 2011.

Distributed Estimation for Wireless Sensor Networks, PES Institute of Technology, Bangalore, India, July 2009.

GRANT WRITING

Awarded grants (\$743k total)

1. Facebook Inc.: "Behavioral Biometrics for Post-password Authentication," \$75,000, 2018.
2. ANDRO Computational Solutions LLC, "DSA Policy Development," 3Yr/\$100k, AFRL Prime, 2018.
3. NSF CPS: "Synergy: Image Modeling and Machine Learning Algorithms for Utility-Scale Solar Panel," 3Yr/\$92k, ASU Prime, 2016.
4. NSF REU Supplement (NSF CRII), 1Yr/\$8k, 2016.
5. Qualcomm Inc.: "Wireless IoT Lab. Phase-II," \$10k, 2016.
6. SenSIP/NCSS I/UCRC: "Behavior Modeling by Analyzing User Movements," \$6k, NSF Prime, 2016.

7. NSF CRII: “CRII: CIF: Distributed Sensor Localization With Ordinal Data Constraints,” 2Yr/\$175k, 2015.
8. NSF DUE: “Collaborative Proposal: Integrated Development of Scalable Mobile Multidisciplinary Modules (SM3) for STEM Education,” Collaborative with ASU, 4Yr/\$287k (CU portion), 2015.
9. Qualcomm Inc.: “Wireless Internet of Things Lab for Sensor Networks, Localization, and Mobile Computing,” \$10k, 2015.

Applied and Pending

1. NSF: CPS: “Medium: Collaborative Research: Localization and environmental mapping for cyberphysical systems,” 3Yr/\$250k, 2018.
2. NSF: SCH: “INT: Collaborative Research: Localization and Flow Prediction of Illnesses from Networked Mobile Biomarker Detection,” 4Yr/\$800k, 2018.

PROFESSIONAL DEVELOPMENT

- | | |
|-------------|--|
| 2018 | ABET: Fundamentals of Program Assessment |
| 2017 | Quality Matters: Applying the QM Rubric (APPQMR) |
| 2008 – 2010 | Preparing Future Faculty, Arizona State University. <ul style="list-style-type: none"> - Fifty students selected from a pool of applicants from the entire University - One of twelve students to successfully complete the program |
| 2008 – 2010 | Teaching Development Workshops <ul style="list-style-type: none"> - Research Misconduct, October 2013. - Introduction to Rubrics, March 29, 2010. - Stress Management, March 2, 2009. - Classroom Assessment Techniques: An Introduction, September 15, 2008. - The Learner-Centered Syllabus, October 1, 2008. |

OTHER PROFESSIONAL EXPERIENCE

- | | |
|-----------------|--|
| June – Aug 2008 | Summer Intern, Freescale Semiconductor, Tempe, AZ <ul style="list-style-type: none"> - Developed algorithms for GPS-Aided Inertial Navigation Systems - Evaluated the need for Kalman filters in the algorithms - Developed a system that was considered for a patent; defensive publication issued |
| Jan – June 2005 | Intern, Philips Medical Systems, Bangalore, India <ul style="list-style-type: none"> - Developed image compression algorithms compatible with DICOM (Digital Imaging and Communications in Medicine) standards and existing Philips Software systems |

SERVICE

Professional Service

- Area Editor – Physical Communications (PHYCOM)
- Program and Events Chair: IEEE SPCOM TC, Phoenix Chapter

- Session Chair, IEEE Frontiers in Education Conference (several).
- Reviewer for Peer-reviewed journals such as the IEEE Transactions on Wireless Communications, IEEE Transactions on Signal Processing, Digital Signal Processing, Elsevier Academic Press
- Reviewer for Conferences such as the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), IEEE International Conference on Communications (ICC), IEEE Global Communications Conference (GLOBECOM)

At the University Level

- Committee member:
 - Wallace H. Coulter School of Engineering Social Media Committee
 - Electrical Engineering Undergraduate Curriculum Committee
 - Department of Electrical and Computer Engineering ABET Committee
 - Department of Electrical and Computer Engineering Graduate Committee
 - Department of Electrical and Computer Engineering Ad-hoc committee on communications and signal processing graduate program
- Interviewer/Recruiter for the Clarkson University Honor's program
- Participant at Clarkson University, Department of Electrical and Computer Engineering Open house
- Speaker at International TA Orientation: *Experiences and observations of current TAs* (2009 and 2010). Annual orientation for new International TAs organized by the Graduate College of Arizona State University
- Reviewer for the ASU Graduate and Professional Student Association (GPSA) Graduate Jump Start Grant Program (Spring 2010) and The Graduate Research Support Program (Fall 2009): Reviewed applications for the programs; had to provide a recommendation (grant funding amount/rejection) for each application.
- Contributed to the ASU academic integrity project intended to "help students and faculty understand cultural differences and discipline specific issues in academic integrity and to educate graduate students about the expectations regarding academic integrity at ASU" (Spring 2009): Participated in discussions based on academic ethics and academic integrity; results published by the ASU Graduate College.
- Presentations to high school students on career options with an Electrical Engineering degree
- Tutored undergraduate students (basic mathematics and engineering courses at the Engineering Tutoring Center at Arizona State University)
- Organizing weekly research presentations at ASU

HONORS AND AWARDS

- Niklas Ignite Research Fellowship, 2018
- Outstanding Teaching award, Eta Kappa Nu Clarkson University Chapter, 2016
- Graduate Teaching Excellence Award (awarded by the Graduate and Professional Students Association, Arizona State University): Nominated thrice; won for the year 2008-2009

- Member of the Eta Kappa Nu Electrical and Computer Engineering Honor Society
- Member of MENSA

PROFESSIONAL MEMBERSHIPS

- IEEE